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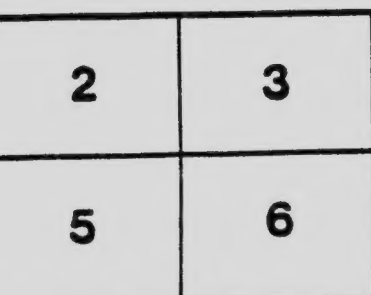
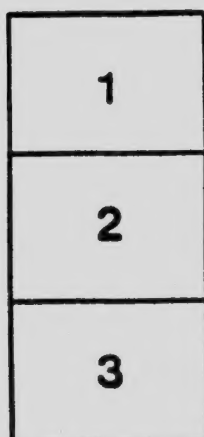
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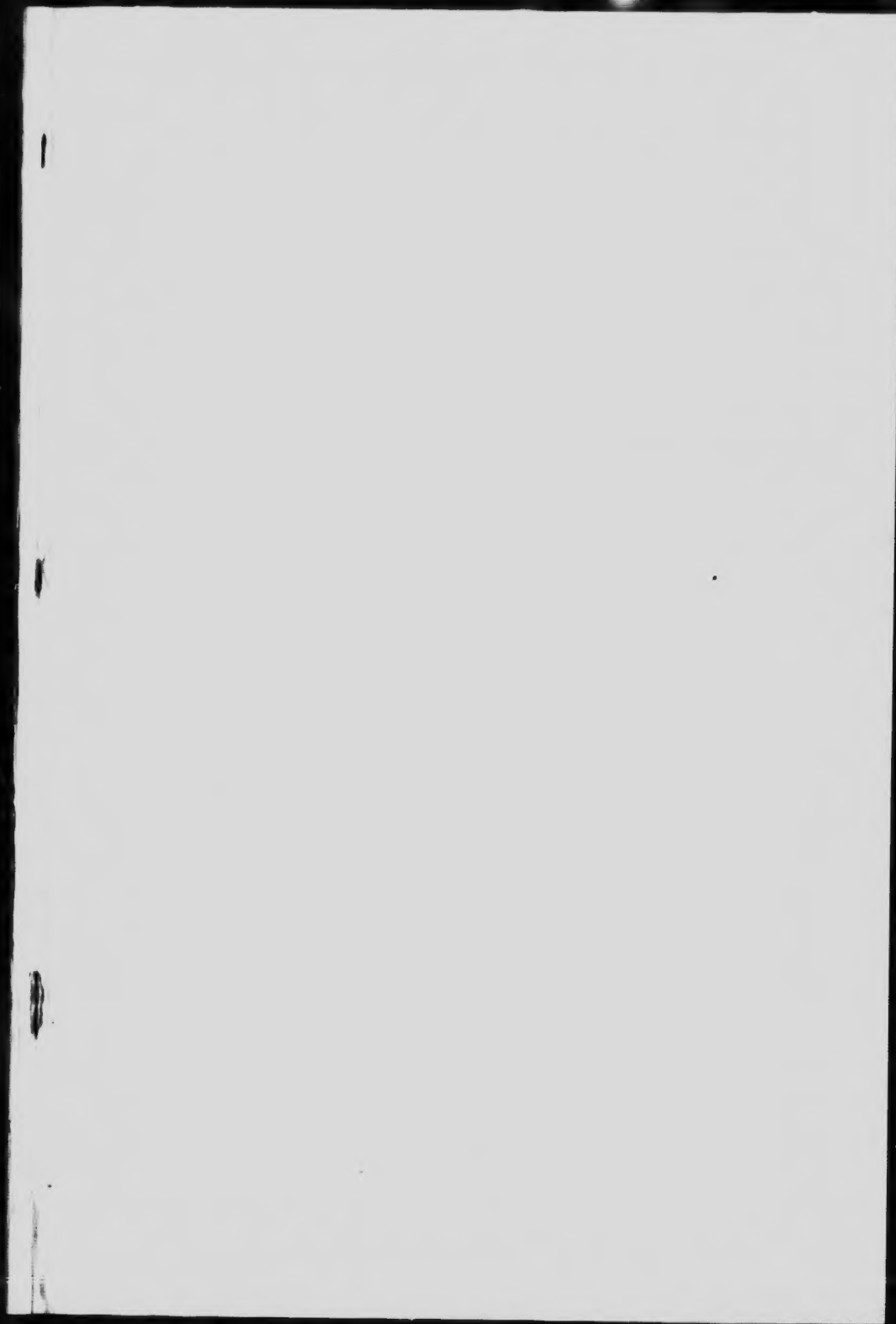


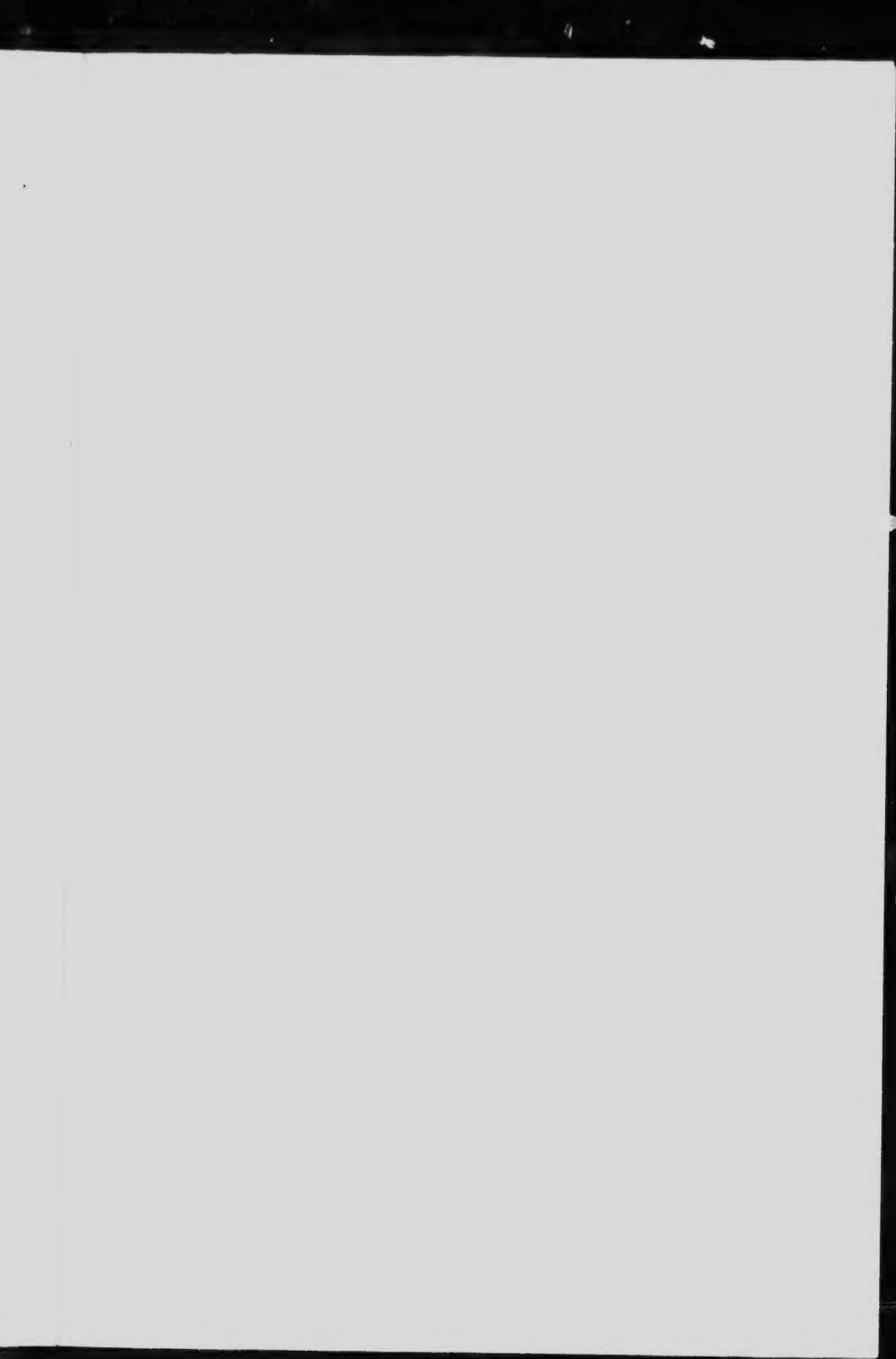


A
GEOGRAPHY
of
MANITOBA

and
The Northwest
Territories

GARRATT







A VALLEY AND RANGE IN THE SELKIRK MOUNTAINS OF BRITISH COLUMBIA.

Gage's Twentieth Century Series.

A GEOGRAPHY
OF
MANITOBA
AND THE
NORTHWEST TERRITORIES

FOR USE IN PUBLIC SCHOOLS

BY
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W. J. GAGE & COMPANY, LIMITED

TORONTO

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PREFACE.

THIS little work on the Geography of the Great Plains of Canada is submitted to its constituency as the natural sequence to the study of home-surroundings. In this, the home is broadened to include the home-land, whose structure, natural history, products, industries, and government, all true home-lovers should know.

The aim of the book is to make the young student perceive and feel the delight of the living interests which are everywhere calling in this new land.

Debatable ground has been avoided, abundance of illustration has been introduced, and the language has been made as simple and as luminous as possible.

E. A. G.

Winnipeg, May, 1903.

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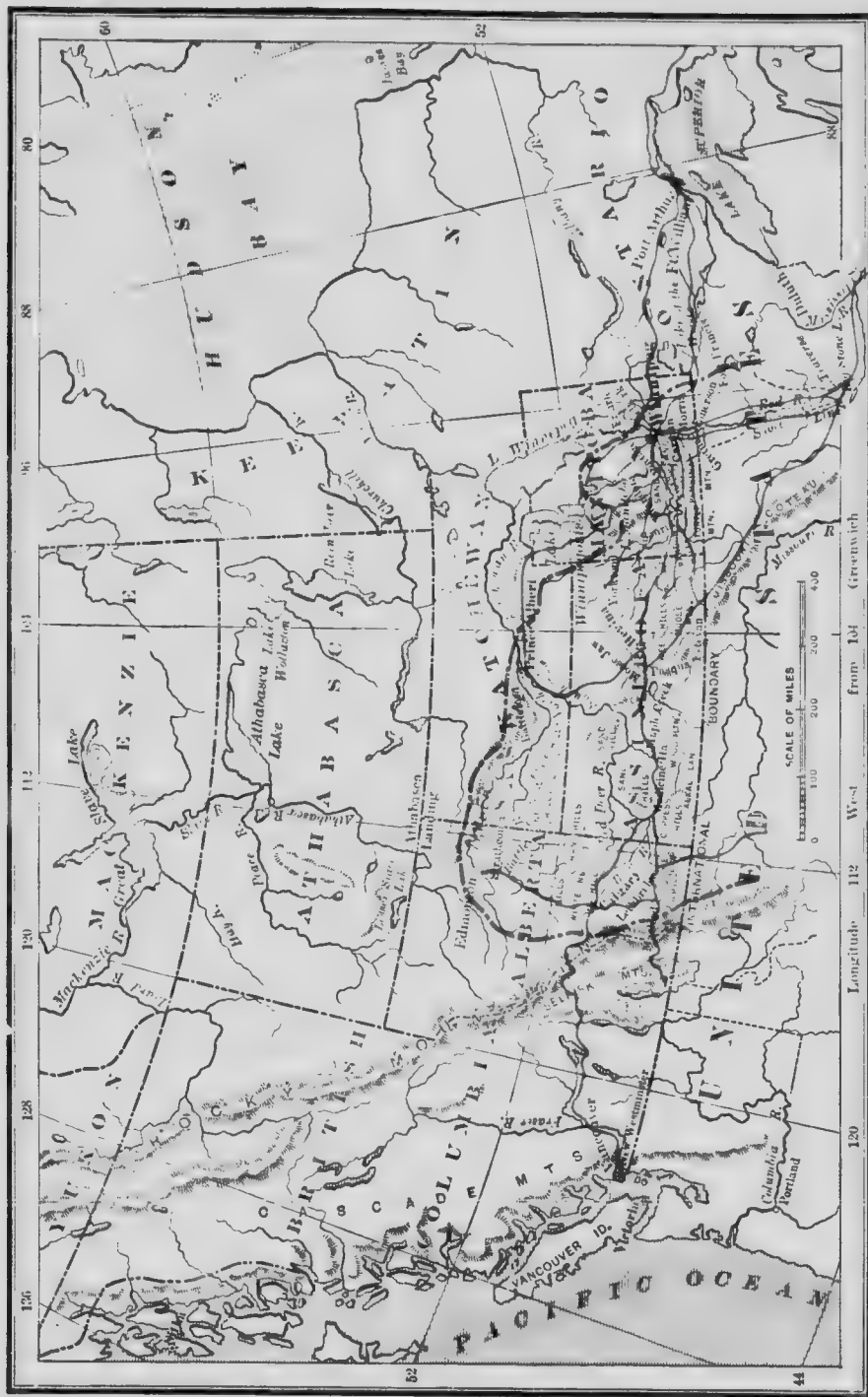
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MAP A. THE WHOLE PLAIN.

INTRODUCTION.

THE central part of the continent of North America consists of a great triangular plain, fenced in on the west by the main chain of the Rocky Mountains, on the south-east by the Allegheny Mountains, and on the north-east by the Laurentian Highlands.

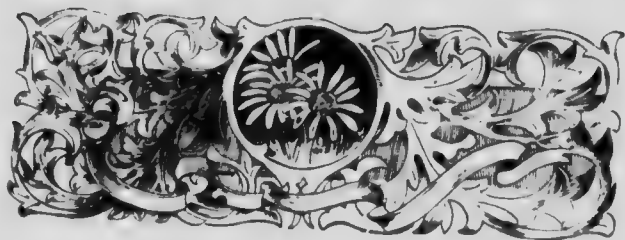


Map B.

THE GREAT CENTRAL PLAIN OF
NORTH AMERICA.

the United States, but the part lying north of the International Boundary Line is the home-land this book describes.





CHAPTER I.

A GLACIER AND ITS WORK.

ALL the great buildings we have ever seen or have ever read about were produced first by the thought of the designer and then by the patient labor of the builder. Even the story-books we so much enjoy existed first in the mind of the writer. Many operations by many people were required to make the books ready for our reading. We enjoy the finished work and have little thought for the toil of the maker. The pens he used, and the paper, are of little account and never have a place in our thought.

It is true in a similar manner with the great world about us. We enjoy its beauties and make use of its riches, but we do not always think of the Great Maker, nor of the method of that great doing, much less of the doers by whose agency it was accomplished. Every great work of the earth's making was performed by a doer suitable to the task. Volcanoes were built by their own internal

fires. River valleys were hollowed out by the streams which flow in them. Sand-dunes were heaped and drifted by the wind. Shore-rocks were broken and crushed to powder by the waves which beat against them.

Now I wish to tell you more fully about one of the Great Maker's great doers, so that you may surely know how it was used in building our own country.



FIG. 1.

THE ILLECILLEWAET GLACIER.

A and B Lateral moraines.

C and D—Drift.

G—Terminal moraine covered with small bushes.

Here in Fig. 1, is a picture of a beautiful valley in the Selkirk Mountains of British Columbia. The trees in the foreground at G, are in leaf, so it must be summer, and yet the great body of ice FE, is not melted away. Beyond F, over the crest of

the ridge, is a great field of ice many miles square. This is sometimes called an *ice-lake*, and we are

A Selkirk Glacier. told that the body of ice F E, is an ice river, called a *glacier*, flowing from the lake down the valley.

We cannot see it move, yet those who have studied it carefully find that this ice-river flows about six inches in a day in summer, less in winter.

For many years this great body of ice has been slowly moving down the valley, sometimes completely covering the plain c D, at others melting away and leaving the space bare, even farther back than its present position. The great weight of the ice and its resistless motion enable it to break off portions of the floor and sides of the valley and afterwards to crush these into smaller pieces, or even to grind them into the finest rock-flour.

The glacier also carries all the rock fragments which fall upon it from the overhanging cliffs.

Material Carried by the Glacier. All this material is moved along by the ice, and is either spread out upon a flat surface such as c v, in which position it is called *drift*, or it is raised in great heaps either at the end of the ice or at the sides. Such heaps are called *moraines*. They are shown at A and B in the picture. When such heaps occur at the side of the glacier, as in the

picture, they are called *lateral moraines*. If the material in the space c d, were piled in a high ridge it would be called a *terminal moraine*, because of its location at the end of the ice. The stream at d, is formed of the water from the melting ice. It is almost milky in color because of the abundance of rock-flour which the water has gathered up.

A careful study of Fig. 2 will show how a glacier is formed and how it acts upon the hillside and valley over which it moves. Great depths of snow at A are pressed into ice by their own weight, and are then forced down the slope, B, and off upon the plain, c, carrying with them stones and rock-waste from the top and sides of the elevation. The rock-waste becomes mixed with the ice and may be used to scratch or grind the surface over which it is pushed. Fig. 3, will make this plain.

The farther the glacier moves the finer will it crush the rock-waste it carries, and the more rounded will it make the large stones, called *boulders*, which are too big or too strong to be crushed. (Fig. 2.) It sometimes happens that a portion of the rocky material slips from the grasp of the ice and forms a bed over which the ice slides. This bed is made up of boulders and finely-powdered rock and is commonly called *boulder-clay*,

**Formation
of a
Glacier.**

**Boulder-Clay
or Till.**

Fine sand and mud
carried away by the
water from the
melting ice

Mud
and
Sand

D
Old Moraine

C
New Moraine
E

Glacier

B
Ice

Loose

Stones

A
Ice made of
pressed Snow

Snow

Moraine. The pile
of stones, sand,
gravel, and earth
made by the glacier
long ago when it was
longer and came this
far.

Drift. The material the
ice left as it was getting
shorter. This is not heaped
up except where the ice is
now building a new moraine.

Stones around finer
and mixed with the
ice. Some material
is collected under the
ice.


Stones are being
broken from the hill
by the moving ice
which is formed of
snow by heavy pres-
sure.

IV.

III.

II.

I.

NOTE. Beneath the moraines, the drift and the ice, is a layer of clay mixed with stones. This is called boulder-
clay or till, marked thus 

TYPICAL GLACIAL ACTION.

FIG. 2.

or is known by the Scotch name *till*. Some of this is also moved forward along with the ice, and at last forms part of the moraines.



At one time the glacier-ice (Fig. 2) covered the space, c, as far as the old

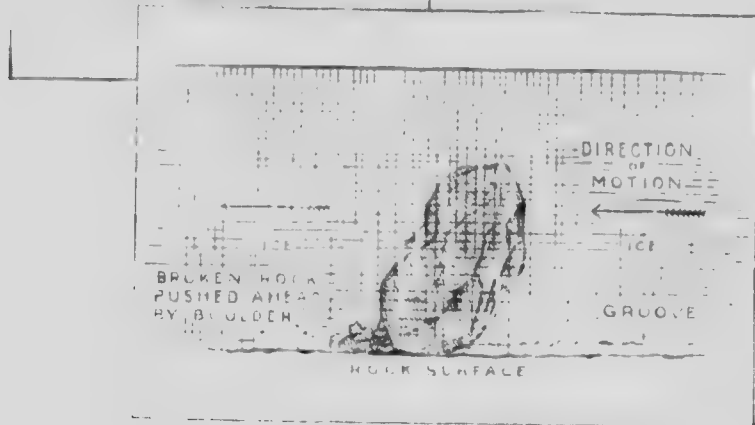


FIG. 3.
ACTION OF EMBEDDED BOULDER.

moraine, D, which, of course, was built of the waste the ice carried. At last the ice melted faster than it moved down from B, and then the end failed to reach the moraine D. The material it carried could not then be added to the moraine, so it was spread out as drift upon the plain, c. When the retreat paused at x, the new moraine, E, was begun.

The water from the melting ice did a great amount of work in sorting and rearranging the glacial deposits. Gravel banks, sand heaps, and clay beds are the forms in which it finally left the materials it carried.

**Work of a
Glacial Stream.**

So we see that a glacier may be a valuable agent in performing some of the works of earth-building.

CHAPTER II.

THE FAR-AWAY HISTORY OF OUR COUNTRY.

WISE men who study the rocks of this great world tell us that at one time, many, many years before the Rocky Mountains had made their appearance, the Selkirk Mountains formed the highest part of the western highland. Upon these mountains snow gathered and either became great glaciers, which gradually crept down the eastern slope, or in melting became great rivers, emptying into a lake which occupied all the great plain east of the present Rocky Mountains.

**The Great
Plain the bed
of an An-
cient Lake.**

The waste carried down from the Selkirk Mountains by the glaciers and rivers was spread out by the waters upon the bottom of this lake, and after great periods of time was transformed into the rocks which lie under the soil of the plains.

Then a change began. Slowly, slowly the Rocky Mountains were lifted up from the western margin of this lake and with them was raised all the bottom of the lake, so that the water was drained away to the ocean and the plain became dry.

When an apple is being baked, and while it is still in the oven, its skin is smooth and tight or even at times is burst.

Rocky Mt.
Uplift.
Disturbed
Rocks of
Foot Hills.
Intrusion of
igneous Rock
in Sweet Grass
Hills.

Undisturbed Rocks of Plains.
Coal in upper and middle part
above limestone.

SECTION AND PANORAMIC VIEW ACROSS PLAIN.

Blocks, generally granites, from
floor on which limestones, sand-
stones, and shales rest.

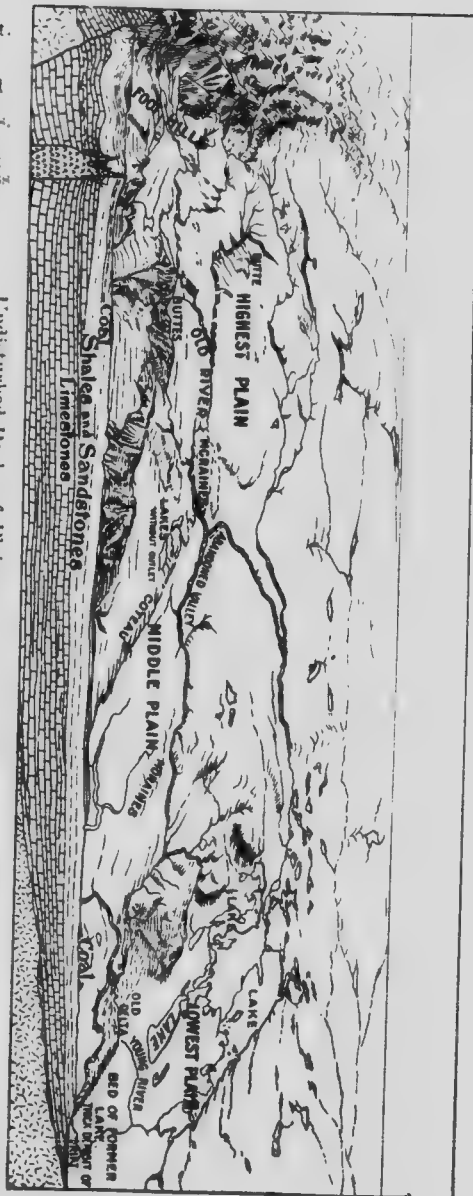


Fig. 4.

When the baking is done and the apple is removed from the oven and has cooled, the skin falls into wrinkles and the apple looks much smaller than before.

The earth is like such a cooling apple. The Rocky Mountains probably represent the formation of a wrinkle on the crust of the shrinking earth.

The rivers which had formerly emptied into the lake now flowed out upon the ancient lake-bottom, recently laid bare, and at once they began to loosen and carry away the surface deposits. How many years these rivers were thus employed no one can say, but most of the upper layers were removed, leaving here and there upon the plain the hill-like remnants of the former level. Many miles of low land now lie between these hills. Thus from Hand Hills to Wintering Hills the plain is nearly forty miles wide.

Find these hills on Map A.

We must now consider what was taking place at the eastern side of the great plain at the close of these long years.

CHAPTER III.

HOW THE LAURENTIAN REGION WAS CHANGED BY
THE ICE.

WHEN you are thinking of the way the Great World-BUILDER shaped the earth and prepared it to be the home of man, you must keep in mind the fact that a thousand years is a very short time in this great work. Probably many thousands of years were required to rear the Rocky Mountains and to shape the surface of the great plain as we find it to-day. Yet this work had been largely completed before the beginning of the work of which you will learn in this chapter.

**Long Periods
of Earth-
Building.**

The rocky country extending from the edge of the great prairie near Winnipeg to the Atlantic Ocean, and including Labrador and portions of the northern parts of Ontario and Quebec, has long been known as the Laurentian Highlands.

It gets its name from the great river St. Lawrence, which drains the south-eastern part.

Trace the limits of the Laurentian Region on some good map.

Wise and trained men have made a careful study of this great region, and have come to the

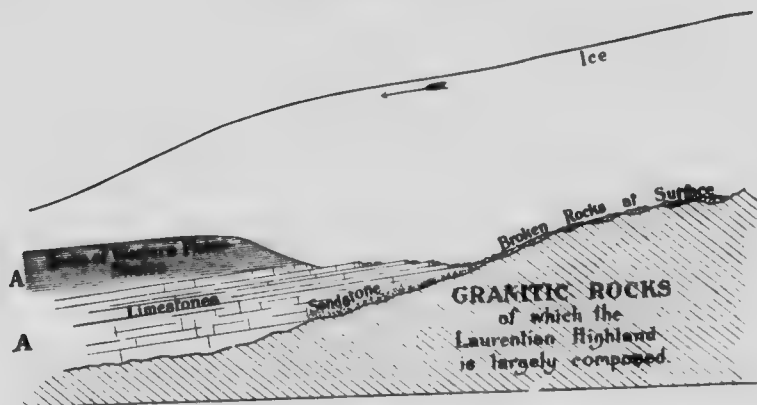


FIG. 5.

IDEAL SECTION ACROSS MANITOBA, WHEN FIRST COVERED BY GLACIER

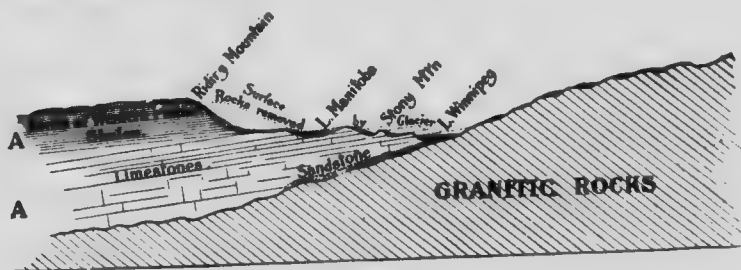


FIG. 6.

IDEAL SECTION ACROSS MANITOBA, AFTER THE GLACIER MELTED.

conclusion that at one time it was covered by a vast ice-sheet which had its centre somewhere near Hudson Bay.

This ice-sheet, or great glacier, was probably many thousands of feet thick upon the Laurentian Highland, near the Hudson Bay centre. How great its very weight must have been! And when one thinks that this great weight was mov-

**Ice-sheet or
Great
Glacier.**

ing outward in all directions from the Hudson Bay centre, it is not difficult to understand that it could tear down and crush vast quantities of material.

Here are two diagrams (Figs. 5 and 6), which are intended to show the possible condition of the Highland before the glacier had made any great change in it, and the condition at present.

It is not supposed that the layers (A, Fig. 5) ever covered the Laurentian Highland. If they



FIG. 7.
ICE-WORN ROCKS.

were there, every trace of them has been removed, and the Laurentian rock itself, though extremely hard, has been cut into hills and valleys by the moving ice, and great quantities of it have been broken off and carried away. Some of these fragments have been found upon the shores of the far northern Arctic islands, as well as upon the hilltops or stream-beds

**Present
Condition of
the Highlands.**

of Newfoundland, State of Ohio, State of Dakota, Canadian prairie west of Manitoba, and many other places.

Find all these places on some good map.

Wherever hills and valleys occurred in the Laurentian surface the ice planed off and smoothed down all their sharp corners, leaving the ridges round-topped. Fig. 7 will show how perfectly the glacier has smoothed and

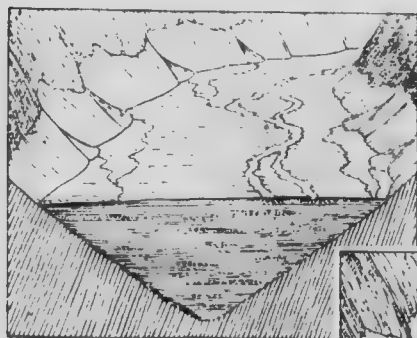


FIG. 8.
A FILLED VALLEY.

rounded the hill-tops.

As the ice melted, great floods of water rushed down the existing valleys, filling them from side to

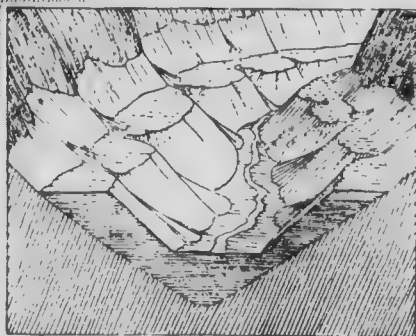


FIG. 9.
A TERRACED VALLEY.

Filling of the Valleys. side, and depositing boulders, gravel and sand evenly over the bottom. In Fig. 8 you see such a filled valley as it existed soon after the great floods from the

melting ice had ceased, because the ice was gone. The small stream seen in the picture was the necessary drainage of the ordinary rainfall. Fig. 9 represents the same valley after the little stream has been at work for many hundreds of years

carrying away the deposits which its great predecessor had left.



FIG. 11.
LAKES SEPARATED BY
MORAINES.

A valley when filled with deposits in this condition, is called a *terraced* valley. Such



FIG. 10.
A TERRACED VALLEY.

A Terraced Valley.

valleys are very common in the Laurentian region. Fig. 10 is a scene in Northern Ontario.

Find the terrace in the valley.

In some cases moraines were so arranged that they formed barriers to the drainage of the country

and thus chains of beautiful lakes occur. They are frequently shallow, and are separated by boulder-strewn morainic ridges. Fig. 11 is a beautiful example of such a chain of lakes. On many of the moraines are to be found numerous boulders of all sizes, some of remarkable dimensions. Fig. 12 is a good specimen. You may judge of its size by comparing it with the boy who has climbed upon it.



FIG. 12.
A BOULDER.

CHAPTER IV.

**HOW THE GLACIER FROM THE LAURENTIAN HIGHLAND
WROUGHT CHANGES UPON THE WESTERN PLAIN.**

THE work of the great glacier was not confined to the Laurentian Highland, but reached out upon all the regions round about. The ice crept slowly westward toward the hills and rivers east of the Rocky Mountains, being joined by another mass slowly moving from the north. Moving slowly, but with great weight and resistless force, it scratched and crushed and ground everything beneath it. Long before it reached the extent shown in Fig. 13, the ice had become thoroughly mixed with rock and soil, and was carrying forward with it an inconceivable quantity of material.

When the glacier had reached the position shown in Fig. 13, its ice blocked all those rivers flowing eastward from the Rocky Mountains and formed a barrier at whose western edge the waters collected as a great lake. The foothills were the farther shore and the outlying hills upon this plain were islands in the lake. Fig. 14 shows such a lake formed at the edge of an ice-sheet. Blocks of ice, breaking from the edge of

**The
Keewatin
Glacier and
the Great
Plain.**

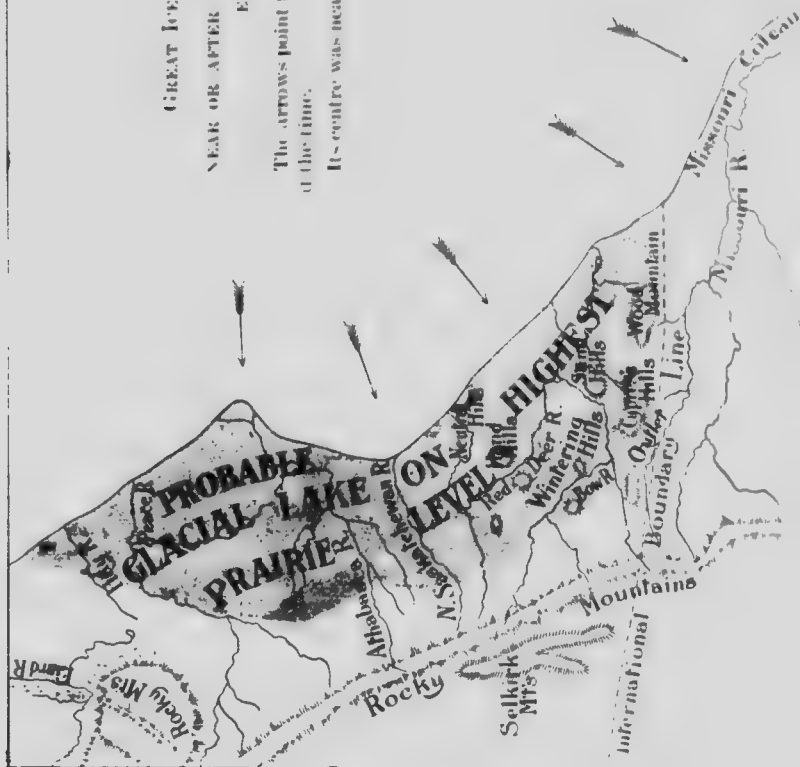
**A Great
Lake.**

FIG. 13.

GREAT ICE CAP, OR GLACIER.

NEAR OR AFTER ITS FARTHEST WESTWARD
EXTENSION.The arrows point the direction of its movement
at the time.

Its centre was near the Hudson Bay.



the glacier, floated as icebergs in the lake. These became stranded upon the islands and, melting there, left the rocks they carried (see Fig. 15) upon the tops and sides of the island-hills many miles from their original Laurentian home.

The water of this lake was far from clear, being filled with rock-flour from the melting ice or brought down from the mountains by the many rapid streams. This settled through the water and formed a deposit upon the floor of the lake, where, now that the water has disappeared, much of it may still be seen.

Deposits in the Lake

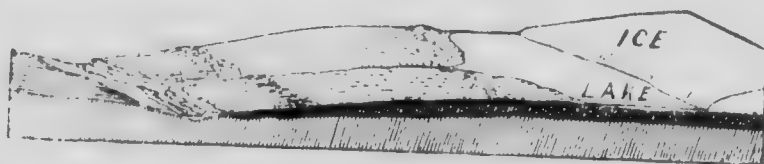


FIG. 14.
LAKE AT THE EDGE OF A RETREATING GLACIER

When the lake had been filled sufficiently, by the streams from the mountains and the water from the glacier, it overflowed the highland at the south and thus found an outlet by one of the branches of the Missouri River. (See Fig. 13.)

Outlet

The Missouri Coteau marks the limit of the western movement of the ice. It consists of heaps of morainic matter twenty or thirty miles wide and several hundreds of miles long. It is not a contin-

The Missouri Coteau.

uous line, but the broken ridges carry out and complete the general direction. These ridges are known by various names. "The Coteau" is the name given at one place.

Find on Map A the names for the various parts of this ridge.

The glacier having maintained its position at the

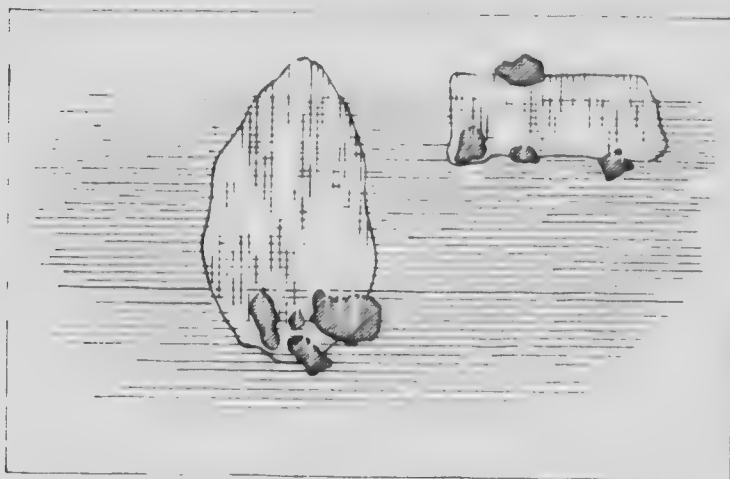


FIG. 15.
ICEBERGS CARRYING BOULDERS.

Coteau for a very long time, at last began to melt off faster than it moved from the east. Thus it drew back eastward till it occupied the position represented by Fig. 16. This retreat was not continuous. Long pauses occurred in the recess-

**First Retreat
of the
Glacier.**

sion, and during these pauses were heaped the drift and boulder clays to form the broken moraines which are to be found scattered over the plain east of the Coteau. Fig. 17 gives a distant view of such a plain.

The retreat of the ice opened an eastern outlet through the upper Saskatchewan River for the water of the great lake upon the highest plain west

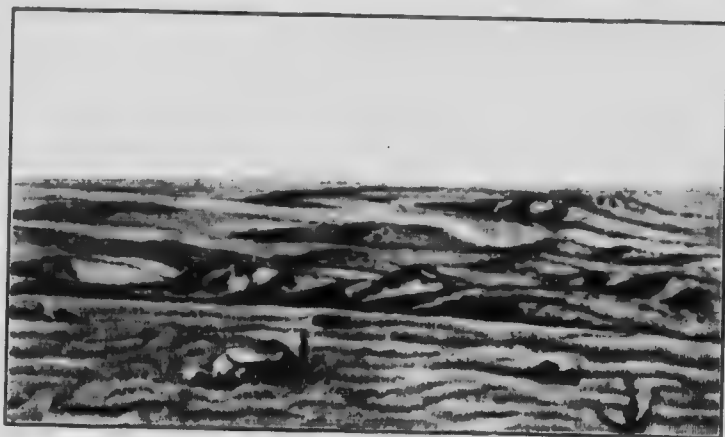


FIG. 17.
MORAINIC HILLS IN DAKOTA.

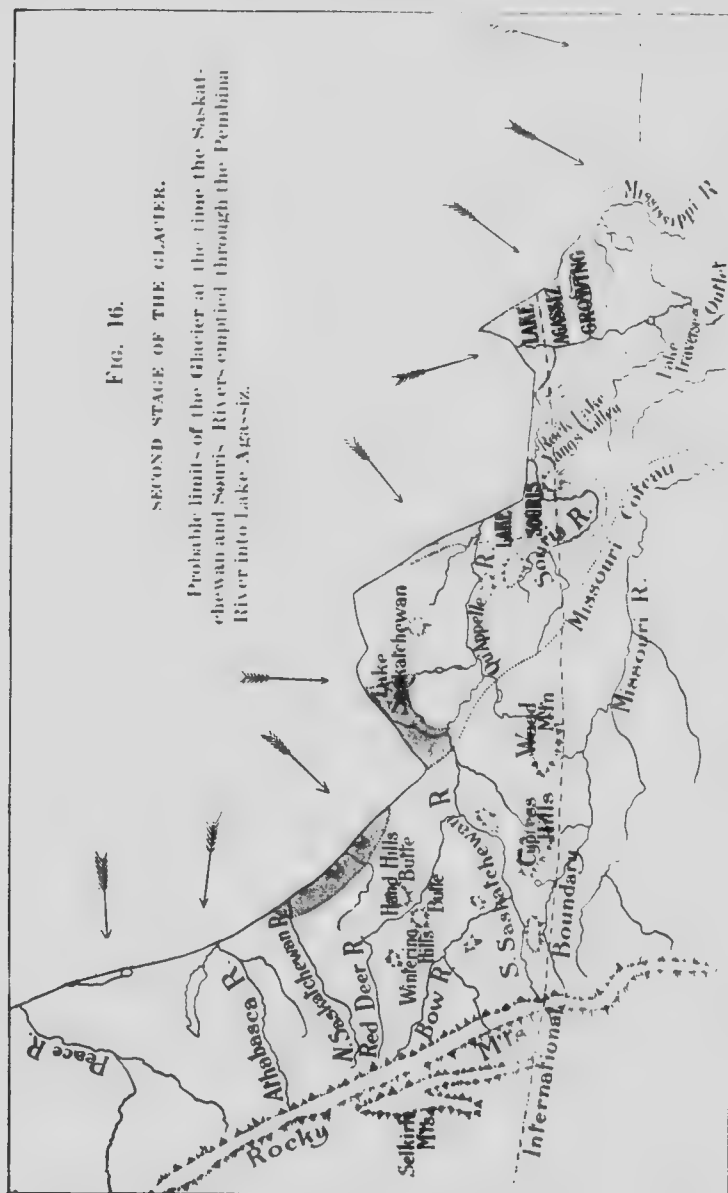
of the Coteau. Thus the greater part of it was drained away. (See Fig. 16 and compare with Fig. 13.) Many lakes, however, still existed in the hollows of the land and along the courses of the rivers, as you can see on Fig. 16.

The course of the Saskatchewan River was still closed by the glacier, so that its waters were forced

FIG. 16.

SECOND STAGE OF THE GLACIER.

Probable limits of the Glacier at the time the Saskatchewan and Souris Rivers emptied through the Pembina River into Lake Agassiz.



Lake Agassiz. to find an outlet through the Qu'Appelle River into Lake Souris. This lake, unable to pour its water through the Assiniboine because of the ice-barrier at the Brandon and Tiger Hills, overflowed through Lang's Valley and Rock Lake into the Pembina River, and thence into a great lake occupying the valley of the Red River and called Lake Agassiz (à-gà-seè) in honor of Louis Agassiz, a famous scientist and teacher.

Lake Souris did not use the outlet through the Pembina River for any great length of time, though long enough for the vast flood of water to sweep out a channel both deep and wide.

The ice withdrew from the Brandon Hills eastward, and after a long period of recession occupied a position shown in Fig. 18. Lake Souris disappeared, being drained into Lake Agassiz at a point east of the city of Brandon. Changes took place also in Lake Saskatchewan, which at this time was probably a very long western arm of Lake Agassiz.

Second Retreat of the Glacier. The west shore of Lake Agassiz was formed by the rise of the second prairie steppe, known as Riding Mountains, Pembina Mountain, Tiger Hills, Pasquia Hills, and Duck Mountain.

Find these hills on Map A, and notice how nearly they are parallel to the former great line of the Missouri Coteau.

Thus the western and southern boundaries of the lake are well marked by these ridges, upon whose sides can still be seen the old shore-lines where the waves beat the pebbles round and smooth. The outlet of Lake Agassiz was over the height of land to the south, into the Mississippi River, through the great channel now occupied by Lakes Traverse and Big Stone.

Find these on Map A.

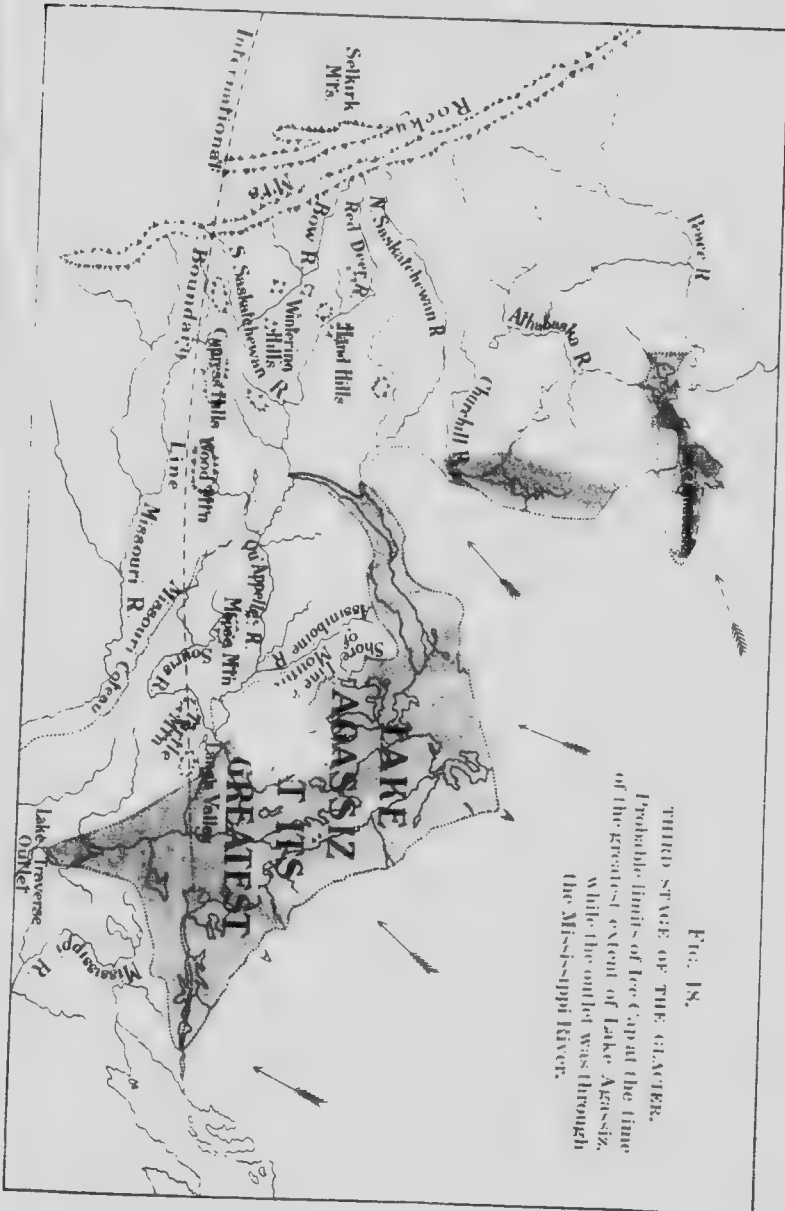
Such great quantities of water from the melting glacier and from the western rivers flowed into Lake Agassiz, and then from it by this Lake Traverse outlet, that the channel was soon made very broad and deep. The removal of the weight of the glacier from the earth caused a gradual rising of the land at the north to probably its previous elevation and maintained the flow of the waters of the lake to the southward. Thus the surface of the lake came to a lower level, and then the old shore-line was left dry and a new one was begun. Several such may be found on the side of Riding Mountain.

The turbid water of the lake supplied material for a great deposit of sediment over the whole lake bottom. The Assiniboine River emptied into the lake near Brandon, and here was formed a deposit

**Old Shore
Lines.**

**Gradual rising of land
at the north.**

**Assiniboine
Delta.**



which was carried down by the river. This was spread out over the lake bottom for a distance of thirty or forty miles north and east and south.

The ice, however, still formed the northern and eastern shores of the lake, and as it was slowly retiring, no definite shore line can be determined

**Greatest
Extent of
Lake
Agassiz.**

to mark those sides. Fig. 18 shows the greatest extent of Lake Agassiz at the time of its southern outlet through Lake Traverse. Fig. 19 shows one of the later stages of the lake. The southern portion of the ice had retired so far northward that the lake found an outlet into James Bay at a level much lower than that at the south. The opening of this new outlet drew the water away from the shore represented by dotted lines on Fig. 19.

The northern ice also melted away, allowing the lake to extend far to the north. It then included

**Northward
Retreat of
Glacier.**

the upper waters of the Churchill River and probably even the Athabasca River and Lake also. The continued melting of the ice opened lower and lower outlets until the Nelson River was freed. The water was then drained away until only Lake Winnipegosis, Lake Manitoba, Lake Winnipeg, and Lake of the Woods are left as small remnants of the once great Lake Agassiz, which at its largest was greater than four times Lake Superior.

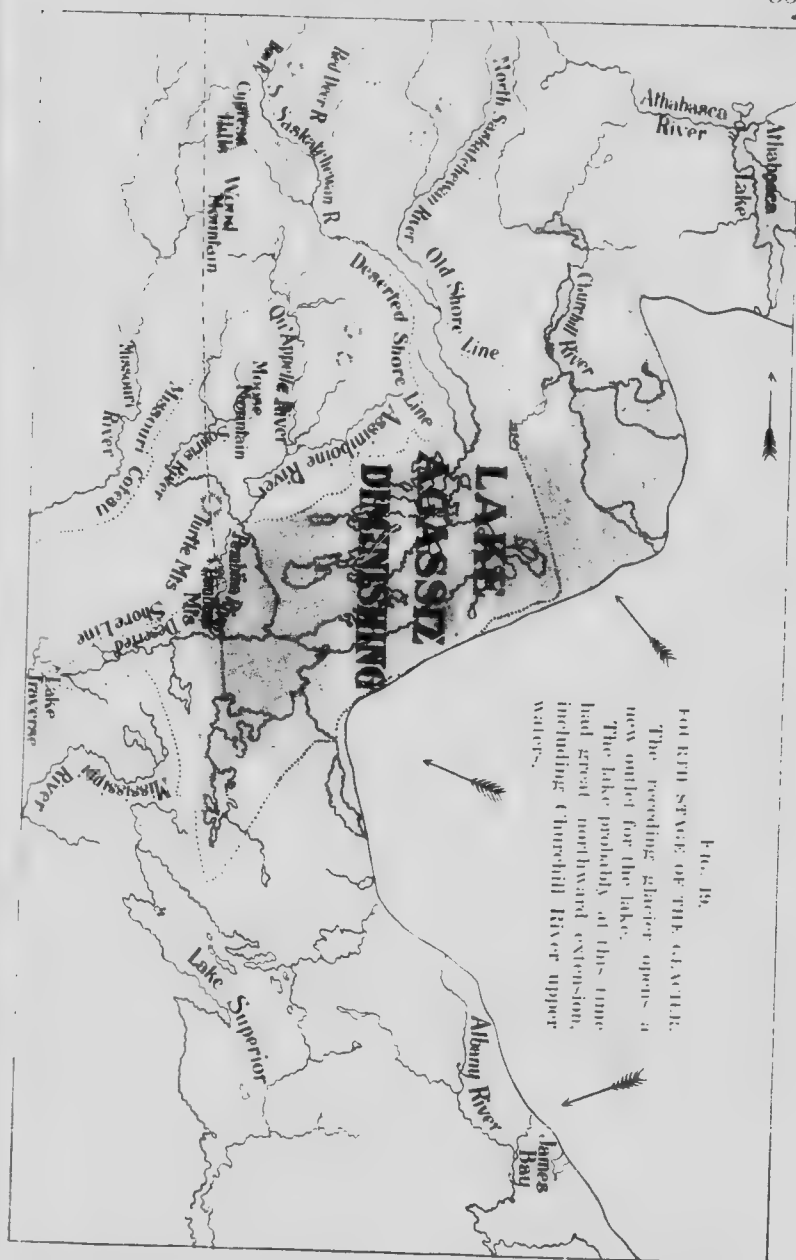


FIG. 19.

FOURTH STAGE OF THE GLACIAL.

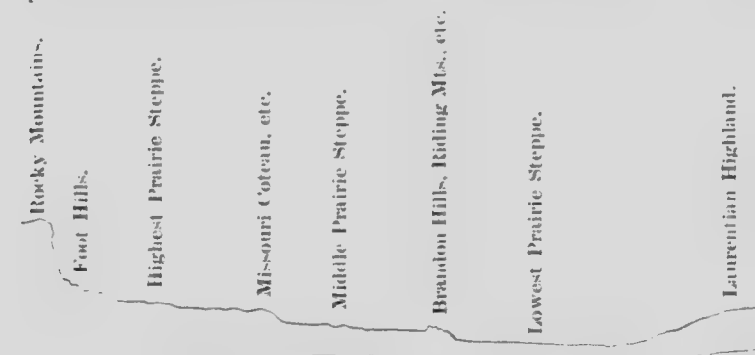
The receding glacier opens a new outlet for the lake.

The lake probably at this time had great northward extension, including Churchill River upper waters.

CHAPTER V.

THE CHANGES WHICH HAVE OCCURRED SINCE THE ICE
DISAPPEARED.

THE retirement of the ice left the great plain lying between the Laurentian Highland and the Rocky Mountains, divided into three distinct levels. Fig. 20 and Map A show the plains and their boundaries. The highest plain was never covered by the Keewatin glacier, whose farthest west-



PROFILE OF THE THREE PLAINS (FIG. 20).

ward boundary is shown by the Missouri Coteau and its extensions. It was an old plain before the glacier dammed its rivers and covered it with a lake. This plain had its streams and valleys and its numerous hills or buttes, which you were told were the remnants of a much higher

plain whose upper layers had been cut down and carried away by the surface water during the many

**Character of
the Earliest
Plain.**

years following the rising of the Rocky Mountains and preceding the coming of the ice. The hills and hill-ridges alone remain to tell us what

this higher plain was like, and a careful study of the rivers may lead us to see how it became changed into its present condition.



DIAGRAM OF PLAIN AND RIVER FIG. 21.

Draw a line as in Fig. 21, *b b b*. Think of this as the surface of the original high plain. Cut out *a* and *a* to represent river valleys. Now, by extending and deepening the valleys *a* and *a*, the form shown in Fig. 22 is soon reached, with the rivers occupying the central depressions *x* and *x*. By further broadening the valley the form shown in Fig. 23 is attained. This shows the river flowing in a rather small valley occupying the lowest portion of a very wide basin between the hills or buttes *b* and *b*.



FIG. 21 MODIFIED (FIG. 22).

All this work of digging and carrying was commenced by the winds and rain and by the flowing water long ages ago, and is going on to-day.

Now, if you travel over the highest plain you will find all the great river basins separated by

THE ICE

plain
and the
to three
Map A
bound-
covered
west-

Laurentian Highland.

Missouri
plain
erred it
and val-
eh you
higher

**Present
Condition of
the Plain.**

such hill-ridges, while the rivers themselves occupy steep-sided narrow valleys. They are to be found on the Bow River, on the Red Deer River, on both branches of the Saskatchewan, as well as on the Athabaska, Peace, and Hay Rivers.

Find these rivers on Map A.

The middle steppe was under the ice, and therefore was subjected to much more severe treatment than was applied to the highest plain.

**The Middle
Steppe.** Its original river-courses, if there were any before the ice came, were all erased, just as you may erase a pencil-mark



DIAGRAM OF BUTTES AND RIVER BASINS. FIG. 23.

from a paper by using a rubber eraser. The glacier was the eraser which removed forever from the middle plain all traces of its former history.

Whatever material the glacier held in its icy grasp was pushed forward to become a part of the

**Deposits
from the
Glacier.** Missouri Coteau; or, upon the melting of the ice, to be spread out more or less regularly upon the plain as glacial drift.

When the ice was receding, the western rivers, swollen by its melting, cut new channels through the drift and boulder-clay. These river

river-narrow and on Deer an, as Rivers. valleys have the form shown in Fig. 22. The Qu'Appelle, Souris, and Upper Assiniboine Rivers and a portion of the Pembina River are example of this kind of valley. The hills upon this plain are scattered heaps of drift, that is, moraines. (See Fig. 17.)



FIG. 24.
SAND HILLS.

Such hills as Turtle Mountain and some portions of the Riding Mountains are older than the glacial

**The More
Ancient Hills
of the Middle
Steppe.**

period, and are probably of the same origin as the "buttes" of the highest plain. They bear marks of their struggle with the glacier, and upon their north-eastern sides have great deposits of drift and boulder-clay, and on their tops boulders brought from the Laurentian Highland.

The lowest plain may have suffered most, as it

suffered longest, from the action of the ice. What it lost was carried far away, and what it gained as drift and boulder-clay was buried beneath such thick deposits of sediment from the waters of Lake Agassiz that it rarely appears, even in the sides of river banks or in places where deep diggings have been made.

In Figs. 16, 18, and 19 find the rivers which flowed into Lake Agassiz and note the location of the mouth of each.



FIG. 25.

BANKS OF RED RIVER, NEAR WINNIPEG.

These rivers brought great quantities of clay and spread it out upon the bottom of the lake near their mouths. Now the lake is gone, but the deposits still remain (Fig. 24). Those formed by the Assiniboine River extend from near Brandon

**Deposits on
the Lowest
Plain.**

to Portage la Prairie, a distance of 75 miles, and from Treherne to Gladstone, a width of about 40 miles. At its deepest place this deposit is nearly 300 feet deep. Its average depth is 50 feet. Upon the more distant portions of this region the deposit was very thin, and has long since become completely incorporated with the surface soil. This is true of the country near Gladstone, Portage la Prairie, and Treherne.

By carefully tracing on Map A the boundary of Manitoba and the shore-line of Lake Agassiz, you will find that a large part of the province is upon the middle plain or steppe. The eastern and northern parts were under the water of Lake Agassiz, and these received the deposit of sediment from the lake or were covered by the material brought in by the rivers.

If you now, on Map A, trace the Red River to its source you will find it, for nearly all its length, flowing through the old lake bottom. Fig. 25 shows how low and steep its banks are. At flood time in the early spring the banks are frequently quite full, and on occasions the river has been known to overflow.

**The
Red River
Valley.**

Of course you know the river did not flow in this direction while the lake was here. You also remember that the ice had erased all marks of any

former river, so the present channel must have been made by the river since the ice disappeared.

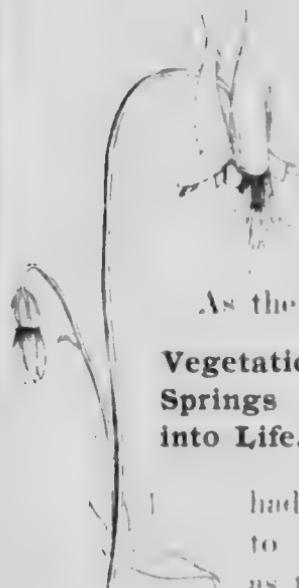
The banks of the Assiniboine differ greatly in the middle and lowest plain. During the time of the existence of Lake Agassiz the Assiniboine was digging the channel through the middle steppe, but it did not begin to cut the channel through the lowest plain until the lake was gone.

**The Banks
of the
Assiniboine.**



ASSINIBOINE AT WINNIPEG.

CHAPTER VI.

HOW LONG YEARS OF NATURE'S
GARDENING CHANGED THE
THREE PLAINS.**Vegetation
Springs
into Life.**

As the glacier and lakes were disappearing from the surface of each of the three plains, they left the soil as bare as a ploughed field. All the array of plants had long been waiting for a chance to invade these regions, so as soon as the water and ice were off even a narrow margin of land, the plants seemed to rush forward and fill the place with life. The bare plains were soon covered with a carpet of grass and ornamented with a pattern of beautiful flowers. In places forest trees sprang up.

Animals and birds followed the plants, and after many years man came. First came the Mound-Builders, of whom we know so little. After them came the various tribes of Indians, and now these are rapidly disappearing before the advancing white race.

You ask how the little plants could so rapidly invade the territory deserted by the receding ice.

If you examine the seeds of plants you will discover that the mother plant has given to each baby plant, the seed, a quantity of food to last it from the time it begins to grow till it has root and leaves

Vitality of the Seeds. of its own and is able to provide for itself. The mother plant has also provided for the babies in another way. Each one is given some mode of travelling

Some go by the wind, as they are provided with wings or tufts of woolly down which act like sails. Some go by the water, and are provided with tough water-proof skins which keep them dry and make them float. Some have hooks and claws which cling to birds and animals, so that the seeds are carried long distances. Who has not been troubled with burs? Some again are imbedded in fruit which animals carry away and distribute, thus scattering the seed. Some little plants

break open their seed-boxes with a flirt and jerk, which throw the seeds away to long distances.

It is not only by the seeds that plants spread.



You have seen the runners of the strawberry and of the silverweed; so you can easily perceive how rapidly these would crawl or creep into the new territory.

These examples are but a few of the ways in which the Great Worker planted the gardens which the

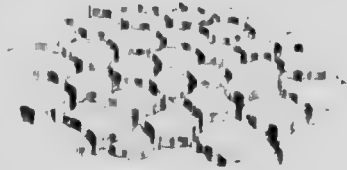


FIG. 26.

The Great Gardener.

glacier and lakes made ready for the seed. Have these great plains not been cultivated in all the many, many years since the plants began upon them? You know how necessary it is to plough and harrow and even to summer-fallow the fields of a farm. How was this done by the Great Gardener?



FIG. 27.

The ploughing was done by the frost and the rain, or by the drought and rain. Both frost and drought crack the

soil to considerable depths (Figs. 26, 27, 28). Surface dust is drifted into the cracks or washed in by the rains, filling them at the bottom and



FIG. 28.

thus uncovering the upper layers of the soil. If this is often repeated, the soil is completely reversed, and that which was at the bottom has come to the top. Is not this a kind of ploughing? Can you

not tell then why the soil of the plains is so black for a long distance down? Is it not because leaves and other bits of decaying plants have been carried down into these crevices and mixed with the deep soil? This is the way in which the Great Gardener has improved the soil of the three plains and made it very fertile.

Prairie fires have swept the plains even before man came to start them. The lightning frequently sets fire to trees, and thus the grass and dead plants are ignited.

**How the Soil
is Vivified.**

In this way the summer-fallowing was done, and the smaller and weaker plants were destroyed so that the stronger might thrive.

The winds have harrowed and drifted the surface dust. The rains have softened the harder materials, so that now, upon the great plains, where once the ice had been or where the lakes rolled their icy waves, there is to be found a fine black soil ready for the plough of the farmer, ready to yield the millions of bushels of wheat which shall feed the hungry of many and far distant lands.

CHAPTER VII.

WHAT THE ARCTIC PLAIN IS LIKE.

If you turn to the Map C, and find on it the river which flows out of Great Bear Lake and trace it to its junction with the Mackenzie River, you will find the place where that river, issuing from a valley of the Rocky Mountains, flows out upon the great Arctic plain. Here

**Junction of
Rocky Mountains and
Laurentian
Highland.**

the Rocky Mountains turn away to the left and the Laurentian Highland sinks beneath the soil of the plain. Along the border line, marked on this Map C, the plain is not flat, but is composed of irregular lines of low hills, treeless and barren. Between these hills are numberless nameless lakes and mossy marshes. Farther north the hills disappear and the marshes become greater, till in the region marked "Tundras" on the map, they cover nearly the whole country. Small elevations like islands interrupt the general level of the marsh, and here a few small trees, alders and birches, partially break the dreary monotony.

Over the whole plain, frozen earth can be found at a depth of at most three or four feet even in the summer season. Yet trees grow along the Mackenzie River as far north as the delta. Here, in a

sheltered locality, are found spruce and pine trees more than a foot in diameter.

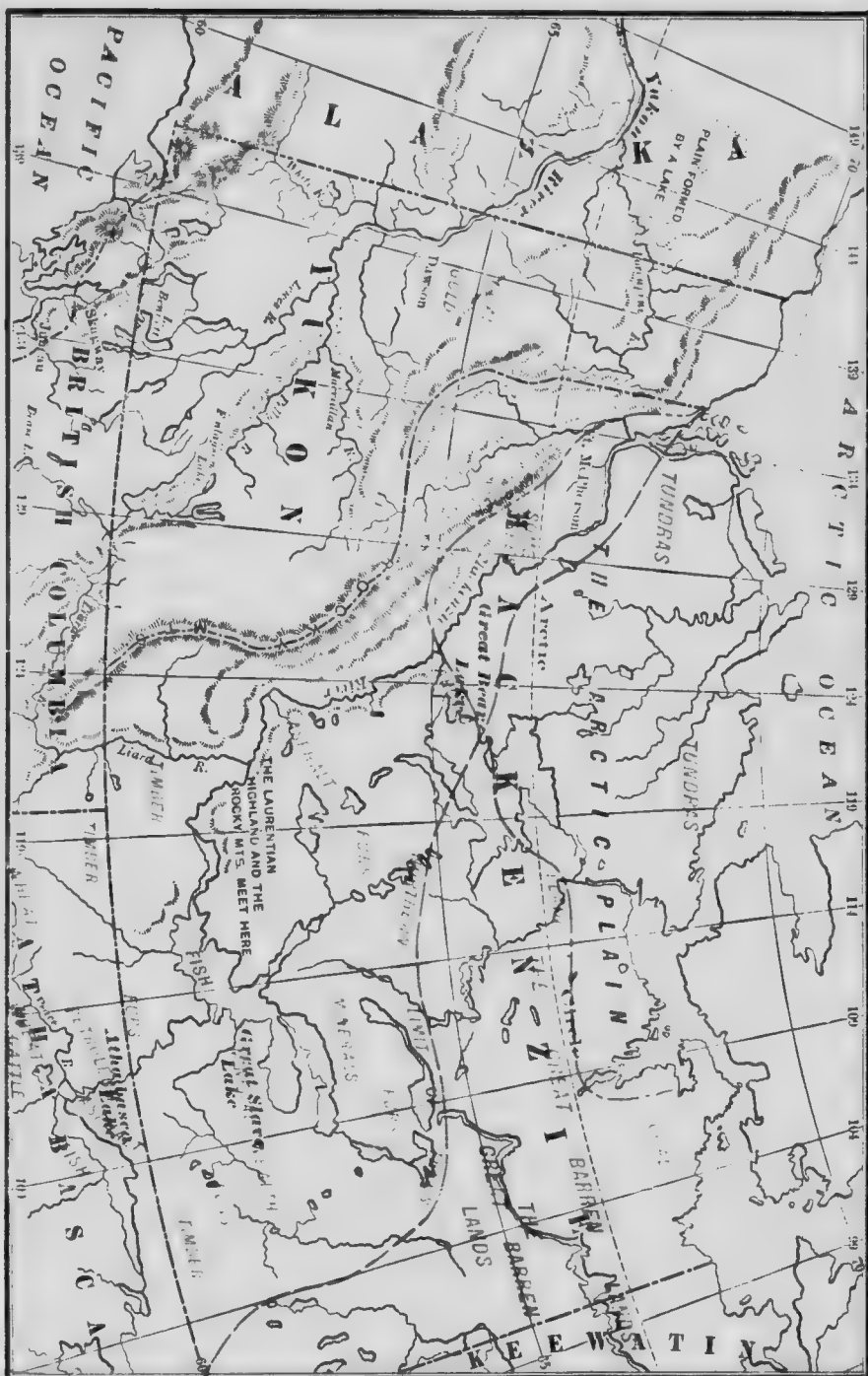
The "Barren Lands" are the most dreary and yet the most beautiful places one can imagine. They are dreary because of flatness and monotony, because of their cold and frozen soil, and because no man can make there his permanent home. But they are beautiful because of multitudes of small and low flowering plants and their myriads of insect and bird life. In the summer the plants bloom and bear fruit such as blueberries, cranberries, etc., which ripen before the short season closes.

**The Home of
Insect and
Bird Life.**

Then the snows seal up these fruits in cold storage till the sun has conquered the frost king in the spring. As the snow goes, the birds come, flocks and clouds of them, until the great plain is quivering with life and harmonious with song. The birds feed upon the fruits, so wisely kept in cold storage during the long winter months for their use. Here they nest and rear their broods, and long ere the snow comes again they have taken their flight to the warmer regions in the far-away south. They are not all song birds which come here, for this is also the nesting place of the wild geese which you have so often seen dragging their A-shaped harrow across the spring and autumn sky.

Tell the story of a wild goose trip to the Arctic Plain.

Describe the "Barren Lands," in a letter to a friend in Ontario, especially mentioning the provision made for the birds in spring.



MAP C. THE ARCTIC PLAIN

CHAPTER VIII.

THE PLAINS AS THEY ARE NOW.

THE portion of the Great Central Plain of North America lying north of the International Boundary

Extent and Line is roughly triangular in shape.
Boundaries It is 900 miles wide along the south,
of the Plains. 1,000 miles along the foothills of
the Rocky Mountains, and 1,500

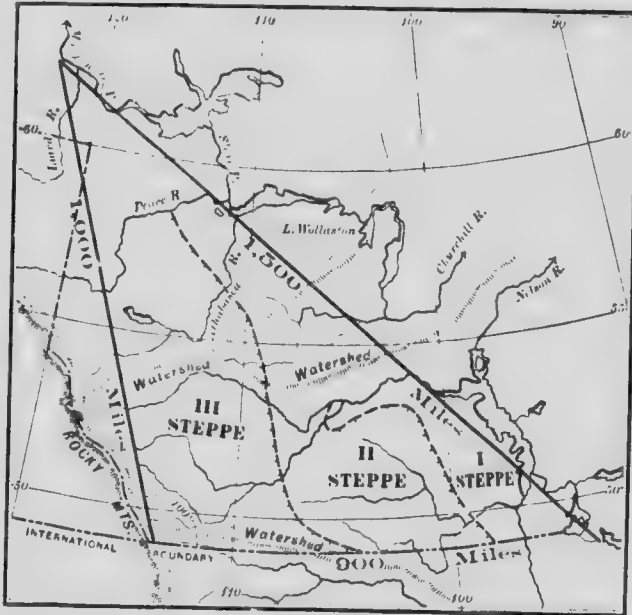
miles along the border of the Laurentian region. The great lakes of this part of Canada lie upon the eastern border of the triangle, and are more or less bounded by both the plain and the Laurentian region.

The slope of the land is such that the rivers flow, in a general course, nearly at right angles to the Rocky Mountains, finding the lowest level or main axis of drainage along the eastern line of the triangle. This can be readily seen on Map C, where the Red, Slave and Mackenzie Rivers are nearly upon this line.

There are three watersheds upon the plains. The southern one is near the International Boundary

The Line for nearly 500 miles eastward
Watersheds. from the Rocky Mountains. It then
turns away south-eastward. The
middle watershed separates the waters of the

Churchill from the Saskatchewan, and the northern one separates the Athabasca waters from the northern tributaries of the Churchill and North Saskatchewan Rivers. Wollaston Lake lies upon the eastern terminus of this watershed, and thus becomes tributary to two river systems.



MAP D.

THE GREAT CANADIAN PLAIN.

The plain descends toward the east by a long, gentle slope which, however, at two places becomes quite steep for a few miles. These places of rapid slope divide the great plain into three plains, known as the

The Slope of the Plains.

first or lowest, the second or middle, and the third or highest prairie steppe. (See Figs. 4 and 20, and Map D.) The first steppe is level prairie at the south. Wooded land appears near Lake Winnipeg, and upon the Churchill River the surface is heavily forested. At the south its width is about 50 miles, at the north 200 miles or more. Its height above the sea rises from 700 to 1,300 feet. Its surface is uniform and its soil all fertile except at the central portion of the ancient delta of the Assiniboine River.

The First Steppe.

The second steppe is more undulating because of the presence of the morainic hills previously described. (See Fig. 17.) The southern portion of this steppe is open prairie. Park-like or open forest begins near the Saskatchewan River. The morainic hills are all wooded (Fig. 29), as well as all that portion of the steppe north of the Saskatchewan River. The width of this plain averages 250 miles. Its height above the sea varies between 1,250 feet and 2,000 feet, the average being 1,600 feet.

The Second Steppe.

The third steppe has a large area of alkali land in its south-eastern part. Immediately north-west of this bad land lies an extensive unwooded rolling prairie. Park-like forest begins about midway between the South and North Saskatchewan Rivers. Great

The Third Steppe.

forests occur upon the watershed north of the Churchill River. In the basins of the Athabasca and Peace Rivers are extensive tracts of prairie, separated by areas of wooded land. The surface of the third steppe is undulating, being chiefly the greatly broadened river-valleys. (See Figs. 22 and 23.)

The width of the plain is 465 miles at the south, narrowing toward the north to about 200 miles. Its height varies from 2,000 feet to 3,000 feet above the sea.



FIG. 29.

SPRUCE FOREST AT DUCK MOUNTAINS.

Character of Third Steppe.

The hills or buttes rise 1,000 feet higher. The general character of the country is a sloping plain diversified by hills and intersected by deep ravines extending far eastward from the foothills.

Lakes are numerous in the hollows of this plain. Those among the wooded regions are of clear water, but the lakes upon the open prairie have

no outlets, except in early spring or during unusual rainy seasons. The water in these lakes is brackish.

The foothills are long sandstone ridges parallel to the Rocky Mountains and separated from one another by narrow valleys, some of which contain impassable morasses or small densely wooded plains. They are formed of the edges of the strata of the plain, folded and upturned by the force which elevated the mountains. (See Fig. 4.) They slope gradually eastward from their height of 5,000 feet to the level of the highest steppe.

They are marked off from the mountains by a great wall of limestone (Fig. 4), rising almost perpendicularly to a height of two or three thousand feet above the highest foothills. This wall trends off in a general north-north-western direction.

The buttes upon the third steppe are frequently nearly flat-topped, and some are still capped with a layer of hard material capable of resisting the wearing of wind and rain. (See Fig. 24.) They are not always simple hills, but are groups branching from a common centre. Hand hills have the appearance of a hand with extended fingers. The valleys between these fingers are wooded.

Find buttes, etc., upon Fig. 4.

THE MACKENZIE RIVER SYSTEM.

The valley of this great river is an irregular triangle, 700 miles at its base along the watershed north of the Churchill River, and 1,200 miles along each of the other sides which meet at the mouth of the river. (See Maps A and B.)

The River Basin.

The stream system is naturally divisible into four parts, namely, the plains portion, comprising the basins of the Peace and Athabasca Rivers and the lower reaches of the Liard River; the mountain portion, in which the stream runs for about 250 miles between two ridges of the Rocky Mountains (Maps A and B); the Arctic Plains portion, leading to the delta; and the portion east of all of these, where the Laurentian streams join this system. These latter streams are mostly short and unimportant.

The Peace and Liard Rivers are swift-flowing streams, but with the overcoming of a few rapids may be capable of navigation almost to the gaps by which they emerge from the Rocky Mountains. The Athabasca is navigable from 100 miles above Athabasca Landing to

The Peace, Athabasca, and Liard Rivers.

the Grand Rapids, a distance of 250 miles. The break in the navigation at Grand Rapids is about eighty miles. This distance is not all rapids, but

eleven miles. There are more or less impracticable places occurring, but there are no long stretches of navigable river between. Below the rapids ships may ply as far as Fort Smith, on the Slave River. The banks of the river are of boulder-clay, steep and high, in some places 400 or 500 feet.

Upon the Slave River at Fort Smith there is a break in the navigation caused by a spur of Laurentian rock which crosses the stream at this point. The break is about fourteen miles in length. Below

The Slave River.

this break the Mackenzie system is navigable to its delta, a distance of more than 1,500 miles following the course of the river. Upon each of these three navigable sections the Hudson's Bay Company have steamers. (See Map C.)

Athabasca and Slave Lakes are beautiful sheets of water abounding in fish. The depressions in which they lie were greatly eroded by the glacier

Lakes

Athabasca and Slave.

which moved westwardly through them, deepening and widening their beds and leaving large moraines at their western extremities. Their eastern ends are far in the Laurentian region, where the hard rocky shore is the cause of their irregular outline. In these portions of the lakes there are many beautiful rocky, wooded islands. The western end of each lake is broad and shallow, with few islands and low, sandy shores. The water at the west-

ern end is turbid from the sediment brought in by the great river. The deltas at the mouths of Athabasca and Slave Rivers are very extensive. The shallowing of the western end of the lakes may be due to silting up by the rivers.

Where the Mackenzie issues from Great Slave Lake it is a broad stream several miles wide.

**The Course
of the
Mackenzie
River.**

This width is maintained for fifty or sixty miles, and then the river narrows to about half a mile, a width which remains constant nearly all the way to the sea. The river flows through wooded plains to about sixty miles below its confluence with the Liard River, where it turns abruptly westward and enters a valley between two parallel ridges of the mountains. These ridges do not border the river, but are several miles back, in most places leaving an undulating plain upon each side of the stream. After about 250 miles the eastern ridge sinks to mere hills, and the other turns away to westward, and the river enters the Arctic plain. At two places on this plain the river flows through deep gorges (the Upper and Lower Ramparts), which were cut by the stream through rocky barriers over which it at one time fell, as a waterfall. These gorges are similar in every way except depth to the Niagara River gorge, or to what the Niagara is likely to be when the river has cut its way back to Lake Erie.

After a long sweep through the dreary tundra, the river again approaches the mountains, is deflected to the northward through its extensive delta, and then enters the Arctic Ocean.

THE NELSON SYSTEM.

The main axis of this system is the line of the Red River, Lake Winnipeg, and Nelson River, a distance of about 1,000 miles, not counting the sinu-
The Axis of the System. osities of the stream. The slope in this portion of the system is slightly less than 1,600 feet.

The Red River rises among the morainic hills in Northern Minnesota, thirteen miles from the source of the Mississippi River. Its course is southward for sixty miles, westward forty miles, and then northward for 285 miles. Its northward course is nearly a straight line, but the meanders of the stream to right and left of the line increase its length to nearly 700 miles. The channel of the river after it turns northward at Breckenridge, in the State of Minnesota, varies from twenty to fifty feet in depth. (See Fig. 25) There are few areas of bottom land bordering the river. Its width is about 100 yards, and its fall is less than one foot per mile. The plain on each side slopes towards the stream at the rate of two or three feet per mile, a slope quite imperceptible to the observer.

Lake Winnipeg is nearly 280 miles long. Its greatest width is about sixty-five miles. The larger northern portion of the lake is partly cut off from the southern by a narrows or straits containing several islands. The southern part is shallow, being greatly silted up by deposits brought down by Red River. The eastern shore is Laurentian rock and the western is boulder-clay and drift. About fifty miles west of

**Lake
Winnipeg
and Lake
Winnipegosis.**



FIG. 30.

ISLAND ON LAKE WINNIPEGOSIS.

Lake Winnipeg, Lakes Winnipegosis (Fig. 30) and Manitoba lie in depressions in the rocks of more recent formation than the Laurentian. The shores of these lakes are of earthy deposits of glacial

formation, except at a few places where the recent rock outcrops. Rocks of similar age form islands in these lakes. Winnipegosis empties southward into Lake Manitoba and thence eastward into Lake Winnipeg by Water Hen River, a marshy stream of no importance.

Lake of the Woods is a truly Laurentian lake, and it, and its outlet, the Winnipeg River, are tributary to the Nelson system.

The Assiniboine River drains a territory 300 miles wide by 400 miles long. Throughout all its upper course as far as Brandon it flows through a very deep, wide valley of ancient formation.

The Assiniboine and Its Tributaries. From Brandon eastward to its junction with Red River it flows in a young or recent valley about fifty yards wide and twenty to thirty feet deep. Its chief tributaries are Qu'Appelle and Souris.

The Qu'Appelle, now a small stream about 200 miles in length, flows in a great channel a mile wide and from 100 feet to 350 feet in depth. In this valley occur several beautiful lakes. The ancient stream which once flowed in this channel was at a level much below the level of the present stream. The valley has been partly filled with materials from the bordering hillsides.

The Souris is also a small stream. It rises in south-eastern Assiniboia, and after making a circuit

through the State of North Dakota, returns to Canada and joins the Assiniboine east of Brandon. Its total course is nearly 400 miles. In its upper course it has banks similar to the Upper Assiniboine. A few miles before entering the Assiniboine it cuts a deep gorge through the line of the Tiger Hills.

Find this place on some large map of Manitoba.

Although the Saskatchewan is not the axial stream of the Nelson River system, it is the most

The

Saskatchewan.

considerable river. It drains a basin 700 miles long by 350 wide. At Grand Rapids, a few miles from its entry into Lake Winnipeg, the river falls 43 feet in $2\frac{1}{2}$ miles. This rapid is the great barrier to the navigability of the stream. Surmount these rapids, and the stream, except for occasional sand-bars, is navigable to the Rocky Mountain House, on the North Saskatchewan, and to the junction of the Bow and Belly Rivers, on the South Saskatchewan.

**Description
of its Course.**

There are as yet no ships upon these streams, though several are this year, 1903, in process of building. On the third steppe the Saskatchewan River flows in a valley, represented in Fig. . On the second steppe the banks are steeper and nearer the river, as in Fig. 21. For the last 100 miles before entering Lake Winnipeg the river flows through

a broad lowland plain, having a height of fifty or 100 feet above the stream. Here the shores are low and swampy and heavily timbered. This is probably a portion of the first or lowest steppe.

The Nelson is the outlet of the whole system of waters flowing into Lake Winnipeg. Its course is northward 200 miles, eastward 100 miles, north-eastward 100 miles to Hudson Bay. There are no areas of

The Nelson River. highlands, but there are many rapids along the stream. The river is navigable for about ninety miles from Hudson Bay. Its outlet from Lake Winnipeg is through a tangle of small lakes and marshy streams for many miles. In this part it flows through a low clay soil covered with forest.

CHAPTER IX.

A SUGGESTED REVIEW METHOD.

*What the Prairie Boulder Told the Man Whose Eyes
Were Open.*

THE boulder was a great rock of grey stone lying partly embedded in the mixed soil upon a hillside in south-western Manitoba. (Fig. 31.)

The man, whose eyes were open, was enjoying a summer afternoon among the flowers and birds.

He came over the hilltop almost at the spot where the boulder lay, and at once began to wonder, as all people should do when they see something



FIG. 31.

A PRAIRIE BOULDER.

apparently out of place. First he wondered if this big stone had always been upon the hillside; then he wondered why its face was so grooved and scratched, its corners so rounded and its sides so smooth, and why there was a path-like depression all around it upon the ground.

Then this great stone, as big as a cord of wood, told the man all about how these things happened.

"My home," it said, "where I was born, is in the great rocky wilderness between Lake Winnipeg and Hudson Bay. There, on a steep hillside, you can find many of our family. I was one of the little ones among my giant brothers.

"You ask me how I got here, why my corners are round, and why my face is scratched, but if you could have seen how the great ice mass used me, you would ask no more such questions. First I was dragged from my ancient bed, and while I was held fast in the ice, my corner was pushed across the faces of all my brothers, who still lay in their beds. This scratched their faces and cut the sharp corner off, and helped to make the round form you now see. Then my position shifted and I was pushed flat, face down, over all the rough rocks for many miles and many years. This scratched my face. Then I was rolled over and over, with many others like me, until all the corners and edges we used to think so pretty were worn round and smooth. I am much smaller now than when I left home.

"There came a day when the rolling and pushing stopped. I had got used to going, and when the pause came I was surprised. My surprise became delight when I felt the ice loosen its grip on me and saw the bright sunshine. Here I have been

for many long years, telling my story to all who are willing to learn.

"What is that? You want to know about that path about me, and why my sides are so smooth? During the many ages I have occupied the hillside and have looked down into that beautiful valley, herd after herd of great buffaloes have yearly come up out of the valley, in the early summer, and have rubbed their great shoulders and sides against me. They wore the path with their feet and polished my sides with their furry coats. The buffaloes are gone, and I still lie upon the hillside awaiting the next work which the wise World-Builder has for me to do."

Then the man whose eyes were open to the wonders that lay around him, passed on down the hillside, a happier and wiser man because he had listened to the story of the boulder.



*What Roches Percée Told the Man Whose
Eyes Were Open.*

It happened, upon a summer day, that the man whose eyes and heart were open to learn all the lessons that "Nature, that dear old nurse," could teach, was enjoying a ramble upon the plain.

The Pierced Rocks had long stood in their places at the side of their valley, awaiting the coming of the man who could understand their language and had time and interest enough to listen to their tale.

They said: "We are but a small remnant of a once great family, but we still occupy the old homestead where we were born. Long before the ice-battle we were here, and were then, as now, fighting the battle against wind and rain.

"We were born in the time of the building of the highest plain, before the Rocky Mountains had arisen and lifted us out of the water. There was no valley then beside us; we were all the country over. The lake where we were born left us to the mercy of wind and rain, frost and heat, storm and stream, till valleys were dug between us, and great numbers of our friends were carried away.

"Then the ice-battle began. We saw the ice come creeping upon us from the north and east, but we were strong and brave and had no fear. We did not know how strong and cunning the ice-monster was. We did not know how thick and

heavy he would become, nor how he would use rocks as tools to dig and grind us.

"At the first shock many of our numbers went down and were bowled away. We have heard that some of them, made very smooth and round, can be seen on the great hills away to the south-west. Many who did not fall at the first shock stood the



FIG. 32.
ROCHES PERCÉE.

pushing and grinding for many years, but at last yielded and were carried away.

"We, who stand here, are all that are left, but we won the battle. The tools and weapons of the ice-monster lie at our feet, abandoned when he fled.

"We watched him retreat, at first rapidly. Then he paused and seemed as if about to attack us

again, but he continued to retreat. Once more he paused, advanced a little, but at last disappeared beyond the north-eastern horizon. We have seen him no more.

"Now our only enemies are the wind and rain, but while they are weak and gentle, their velvety fingers are slowly but surely doing what the strong and cruel foe could not do. We are pierced with wind-blown holes and will eventually pass away."

The man whose eyes were open thought this was one more instance of the soft and gentle forces doing what the great and fierce could not accomplish.

He passed on down the valley among the birds and flowers—down the valley over which the rocks keep watch until the day when the wind and rain shall have turned them into the fine dust of the earth.

SUGGESTIONS FOR SIMILAR TREATMENT.

1. What the listener heard in the valley of the Qu'Appelle (who calls?) River.
2. What the winds told the man who rested an hour under the shade of a sandhill spruce.
3. The history of a rocky island in Lake Winnipegosis.
4. What Moose Mountain told the Arcola boy.
5. What Lake Winnipeg told the man who would see things and ask "why?"
6. What the long lake-beaches on the hillsides have to tell.
7. What the Chinook wind shouted to the listener.
8. What the snow-bird told the man who asked questions and then hunted for the answers.

CHAPTER X.

THE CLIMATE OF THE GREAT PLAINS.

THE climate of the three prairie steppes is sufficiently varied to require particular attention.

These plains lie in the northern part of the north temperate zone, as far from the equator as Labra-

Latitude. dor and Siberia. They are centrally located in the continent, and are therefore far out of the reach of the direct tempering influences of the ocean. Their slope is toward the north and east. They are subject to great extremes of climate.

Throughout the year the sky is markedly free from clouds, the percentage of sunshiny days being greater than that of almost any other country in the same latitude. The air is dry and invigorating.

Summer Temperature. In summer the days are long and warm, but because of the rapid radiation of the heat they are usually followed by comparatively cool nights. The average yearly amount of rainfall, including also the water represented by snow, is between seventeen and eighteen inches for Manitoba and between thirteen and fourteen inches for the remainder of the southern part of the great plains. The excess

in favor of Manitoba is probably caused by the influence of Hudson Bay and the great lakes.

Eastern Assiniboia receives more rain than Western, and Northern Alberta much more than the southern portion of the same territory. Saskatchewan has more rain than either

Rainfall. Manitoba or Assiniboia. In general, therefore, the rainfall at the east and north is greater than that at the south and west. This does not apply to the Mackenzie River valley, where the average rainfall is less than ten inches per year. This small rainfall will probably account for the fact that there are no great glaciers in the Rocky Mountains north of the latitude of the Peace River. About three-fourths of the total rain falls between the first of April and the first of October.

The winters are severe, the days short and cold, the air clear and bright and frequently filled with myriads of tiny snow crystals which sparkle like diamonds in the sunlight. The inhabitants have learned both how to build their houses and how to clothe themselves, so that no one seems to suffer much from the severity of the weather.

The great storms known as "blizzards" are rare, not averaging one per year for the

Blizzards. past twenty years.

The snowfall rarely exceeds a depth of twenty inches. It is greater in Eastern Manitoba than in

Alberta and Saskatchewan. Outside of Alberta, thaws seldom occur in winter, and rain at this season is almost unknown. The seasons change without long delay; in fact, sometimes almost abruptly.

**The
Snowfall.**

In general the western part of the great plains has a warmer climate than the eastern. This is due mainly to the influence of the Pacific Ocean. From the boundary line northward through Alberta for several

**The
Chinooks.**

hundred miles there is little variation of climate. This milder and widely distributed climate is caused by the Chinook wind, which is probably the southwest wind of the Pacific Ocean forced up and over the mountains. Having lost its moisture as it ascended the mountains, it descends upon the plains as a warm dry wind, whose influence is felt as far north as the Liard River, and occasionally, though rarely, as far east as Winnipeg.

The influence of latitude is more marked in the eastern half of the plains, the climate at the north end of Lake Winnipeg being much colder than that at the city of Winnipeg. This eastern portion of the plains is within the influence of the variable winds of Central North America.

**Effect of
Latitude.**

For a full discussion of this wind, see North American Cyclone in "Eclectic Physical Geography."

Tornadoes are of rare occurrence, and when they occur their influence is extremely local, usually less than two miles in width and not more than thirty miles in length.

Tornadoes.

The plains are also visited, though rarely, by hot winds from the south. They occur during the

Hot Winds. hottest summer month, and are supposed to originate in the "Bad Lands" of Wyoming and neighboring States. When they continue to blow for several days they have an injurious influence upon the growing crops.

CHAPTER XI.

THE PEOPLE.

THE greatness of a country as well as its material prosperity is determined by the character of its people.

We call this a new country because it is but a few years since the first white settlers began to cultivate the soil of these great plains.

**The
Occupants
of the
Country.**

Look around among the people you know and see how many you can name who were born in this country. Nearly all the older white people came from other parts of Canada, or from lands beyond the sea. The great majority are Canadians from Ontario and Quebec and from the Maritime Provinces. Many are from the "Mother Country," Great Britain. There are people from the United States, from France, Germany, Russia, Austria, Italy, Sweden, Norway, Denmark, Iceland, and many other places. They have come to make this land their home and to help make this new homeland a great country and an important part of the great British Empire.

Settlers who came from foreign lands wished to form groups of their own people in various parts of the country. Thus we have the Icelandic settle-

ment at Gimli, on Lake Winnipeg; the Mennonite settlement, in Southern Manitoba, near Rosenfelt; the Galician settlements in south-eastern and north-western Manitoba, and the Doukhobor settlement in north-eastern Assiniboia.

Settlers a Mixed Race. But all these people, no matter what their former land, have here one common purpose, and that is to make for themselves comfortable and happy homes. In doing this they must necessarily benefit the country and tend to increase the happiness of all.

Did you ever think that there is a reason why the people in any portion of a country do this or that work? A fertile soil lying in a country of sufficient rain and of suitable warmth will always determine a large portion of its inhabitants to agricultural pursuits.

What conditions will lead the people to engage in the care of cattle?

What conditions will produce a lumbering industry? a mining industry? a fishery?

There are coal deposits and rich copper veins on the shores of the Arctic Ocean, but there are no miners at work there. There are forests along the great Churchill River, but there are no lumbermen there.

The Arctic mineral deposits will be mined when there are people demanding the products of such

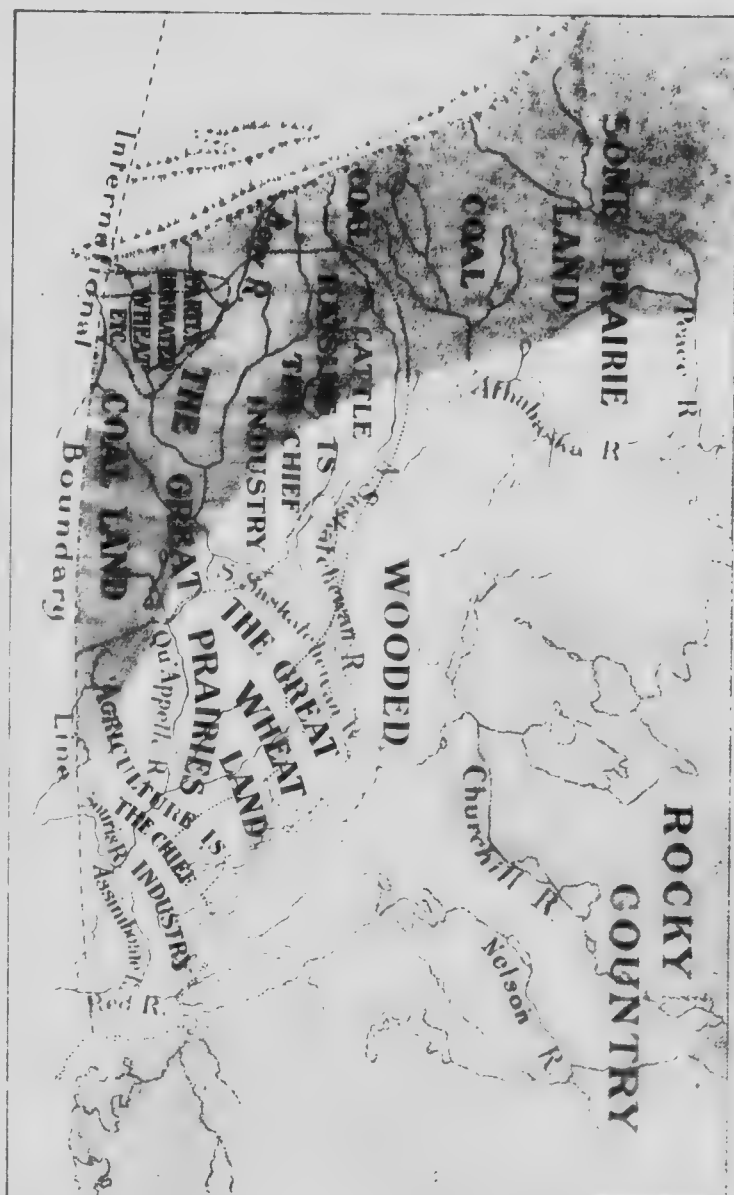


FIG. 33. MAP SHOWING LOCATION OF SNOW BELT.

mines. The forests of the Churchill will become lumber for our markets when the supplies nearer civilization are more completely exhausted.

**Rich Deposits
yet Unearthed.**

The opportunity of taking advantage of water-power for the running of mills determines the existence of a milling industry at some particular place.

But this does not always follow. There are artificial conditions, as well as natural conditions, which determine how the people of a district or town shall be chiefly employed.

The necessities of a farming community, in the matter of food and clothing alone, will make it necessary that some men shall be employed as merchants, others as carriers or shippers of goods, others as manufacturers.

Thus you see that the industries of a country depend upon a variety of causes. The character of the soil, the presence of forests and of valuable minerals; the conditions of climate, the presence of water-power, facilities for the transportation of goods, and even the necessities and whims of the people, all help to fix the nature and number of the industries of a country.

**Dependable
Industries.**

Study carefully Fig. 33, and try to make out the industries which belong to each portion of the country.

Similar causes also determine the existence of the towns and their locations.

Many years ago, before railways were such an important factor in a country, the towns owed their location more to the presence of navigable rivers, or to the existence of waterfalls. But now there are few towns whose very existence is not determined by the railways which run through them.

Name a few towns in these western plains which apparently are not located because of the railways. Name many which are so located.

Why is Winnipeg where we know it to be? What determined the location of Prince Albert? of Regina? of Emerson? of Calgary? of Edmonton? of Estevan? of Lethbridge?

CHAPTER XII.

TOWNS, CITIES AND TRANSPORTATION.

In the early days the most primitive methods of transportation were all that were necessary.

Transportation in Early Days.

The furs to be exported and the necessary articles of import might all be carried upon the backs of the traders or by canoe or York-boat on the streams in summer or by dog-trains in the winter.

Now, however, the imports and exports are so great in amount and value that numerous railways already traverse the country and others are shortly to be built.

WINNIPEG is the natural inlet and outlet of the great West. Here centre the railways, and here, in time, will be the centre of manufactures. Besides its commercial importance, Winnipeg is the political centre of Manitoba. Here are located the Provincial, Legislative and Departmental offices, and the Dominion Immigration, Lands and Timber offices. Winnipeg is also the educational centre of the great plains.

ST. BONIFACE is situated upon the east side of Red River, opposite Winnipeg. It is the distinctively French town of Manitoba. St. Boniface College, one of the affiliated colleges of Manitoba University,

is one of the oldest educational institutions in the country. The poet Whittier, many years ago, called the attention of the world to this little town. Fire destroyed the "turrets twain," but from the ashes arose a new cathedral in whose spire still swing and chime the "Bells of St. Boniface."

Out from Winnipeg radiate the numerous lines of railway. Toward the east by the



FIG. 34. PORTAGE AND DOG SLED.

Canadian Pacific Railway we reach, first, Rat Portage and Keewatin. These places are rapidly growing in importance as milling, lumbering, and mining centres. Farther east, Fort William and Port Arthur are the great shipping points for the grain of the western prairie.

Winnipeg is also connected with Port Arthur by

Railway Outlets.

the Canadian Northern Railway. This line passes south of Lake of the Woods, for a short distance in the State of Minnesota, and returning to Canada traverses a valuable timber, mining, and agricultural region in this western part of New Ontario.

SELKIRK is situated on a branch railway line, twenty-four miles north of Winnipeg. It is sixteen miles from Lake Winnipeg and has been for many years the head of the navigation upon that lake. Here are located the storage houses and refrigerators of the fishing industry. Here also is the market for the lumber industry of the lake.

South of Winnipeg three railways reach the international boundary line at the gateway towns of

**Numerous
Railway
Towns.**

Emerson, West Lynne, and Gretna. South-westward from Winnipeg and westward from Morris and Rosenfeld extend three lines which run in nearly parallel directions, traversing the portion of the province south of the Assiniboine River. These lines pass through small towns of considerable local importance, among which may be named Morden, Manitou, Boissevain, Melita, Napinka, Souris, Hartney, Wawanessa, Carman, and on an extension of one of these lines in Assiniboia, Estevan, a town of some importance on account of the coal deposits in the neighborhood.

PORTAGE LA PRAIRIE, fifty-three miles west from Winnipeg on the Canadian Pacific Railway, is so

called because here, in the early years, the traders carried, or "portaged," their goods over the prairie between Assiniboine River and Lake Manitoba. This town is the junction point of the Canadian Pacific and the Canadian Northern Railway lines west of Winnipeg.

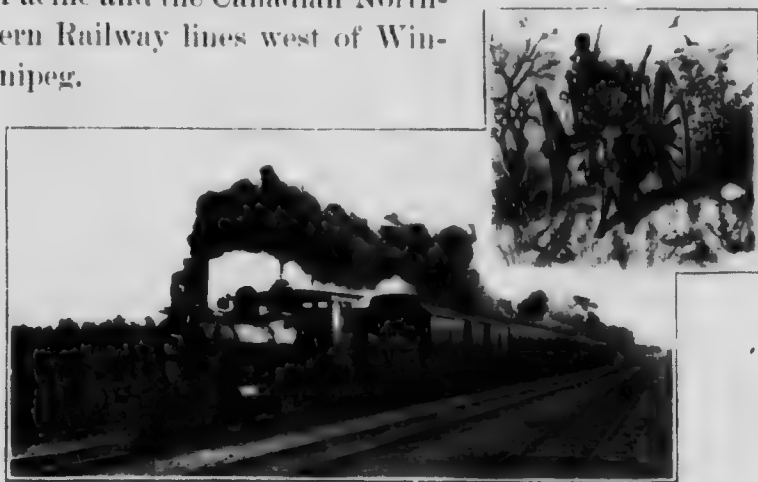


FIG. 35.

North-westward from Portage la Prairie railway lines pass through several active and important towns, among which we should name Neepawa, at the northern border of a beautiful plain; Minnedosa, in the deep valley of the Little Saskatchewan River, and Dauphin and Yorkton. The last named is in Assiniboia.

On the main line of the Canadian Pacific Railway, west of Portage la Prairie, we soon reach CARBERRY, 105 miles west of Winnipeg. This town occupies the southern part of the beautiful plain extending southward from Neepawa, twenty miles

away. Several miles east of Carberry lie the great sandhills of the Assiniboine delta.

BRANDON is an active city, 133 miles west of Winnipeg on the main line of the Canadian Pacific Railway. It is the second city in the west in population and commerce. It is also an educational centre of some importance. From Brandon a railway extends south-eastward through Methven and Wawanesa, thence eastward to Morris, on the Red River, south of Winnipeg. And from Kenney, the next station on the Canadian Pacific Railway west of Brandon, a branch line passes through Souris, Hartney, and Napinka to Estevan, in Assiniboia; continuing westward, the main line of the Canadian Pacific Railway passes through several important prairie towns, including Virden, in Manitoba, and Moosomin and Indian Head, in Eastern Assiniboia.

REGINA is the capital of the Northwest Territories. It is on the main line of the Canadian Pacific Railway, 357 miles west of

**Regina,
the N. W. T.
Capital.**

Winnipeg. The town is well laid out upon a level plain, so level that the prominent buildings are visible for many miles in any direction. The Territorial Government offices are located here and the headquarters of the famous Mounted Police. A line of railway extends northward from Regina to Prince Albert, on the Saskatchewan, a distance of 250 miles.

The "Soo Line," a portion of the Canadian Pacific system, branches from the main line at Sudbury, in Ontario, north of Lake Huron; passes through Sault Ste. Marie and along the south shore of Lake Superior, thence to the city of St. Paul, and thence, north-westward, re-enters Canada at North Portal, near Estevan, and rejoins the main line at Pasqua, near Moose Jaw, forty miles west of Regina.

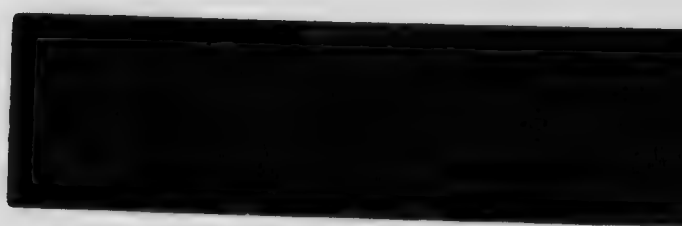
For the next 250 miles along the Canadian Pacific Railway, west of Moose Jaw, the most important of the towns are Swift Current, Maple Creek, Dunmore Junction and Medicine Hat. At Dun-

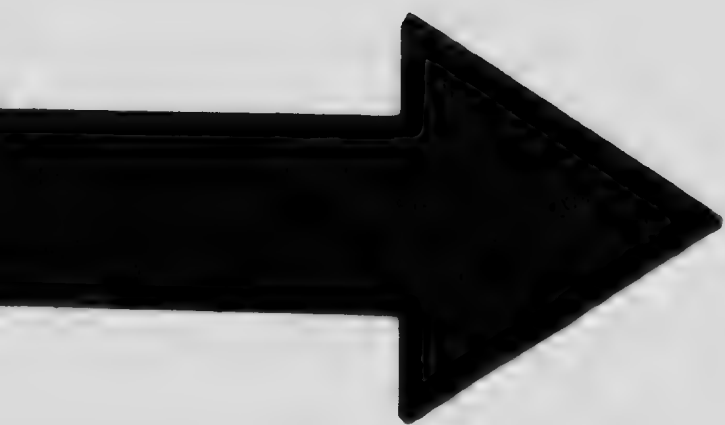
Crow's

Nest Pass.

more Junction the Crow's Nest Pass Line branches from the main line of the Canadian Pacific Railway, and passes through Lethbridge and Macleod to the Pass, by which it enters the Kootenay region in southern British Columbia. From Medicine Hat, 661 miles west of Winnipeg, the Canadian Pacific Railway extends north-westward to Calgary, the only city at present in the Northwest Territories.

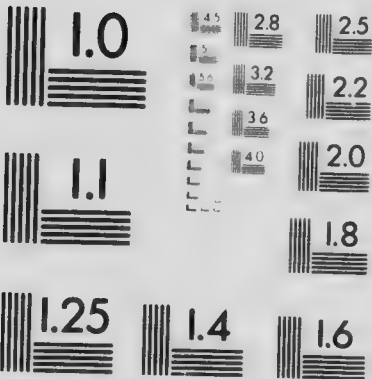
CALGARY is 840 miles west of Winnipeg and 483 miles from Regina. It is situated upon a low plain at the junction of the Bow and Elbow Rivers, and is surrounded by high hills forming the banks of these streams. Many of the buildings in Calgary are constructed of a fine sandstone quarried in the river banks near the city. From Calgary a railway extends northward through a beautiful prairie





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and wooded country to Edmonton, a distance of 192 miles.

A line also extends southward to Macleod and Lethbridge and thence across the international boundary line to junction points with the railways of the United States.

Fifty miles west of Calgary the Canadian Pacific Railway enters the Rocky Mountains, and passing through Canmore, Anthracite, Banff and Laggan, enters British Columbia.

EDMONTON is the most important town in Northern Alberta. It is on the north bank of the North Saskatchewan River. It is the commercial supply centre for all points in the far-away Mackenzie valley.

STRATHCONA is on the south bank, opposite Edmonton. On the railway between Calgary and Edmonton may be named Red Deer and Wetaskiwin.

CHAPTER XIII.

THE INDUSTRIES OF THE THREE PLAINS.

THE cultivation of the soil is by far the most important industry of the plains. The land within

Agriculture. the borders of the great triangle, shown in Map D, is not all capable of cultivation, for various reasons. Some of it is forest covered, and many years will elapse before these forests are cleared away. Some of the land within the triangle receives too little rain, and some is covered with deposits of sand and boulders, so as to render it worthless.

The accompanying diagram (Fig. 36) refers only to the prairie region indicated on Map A, south of the timber line.

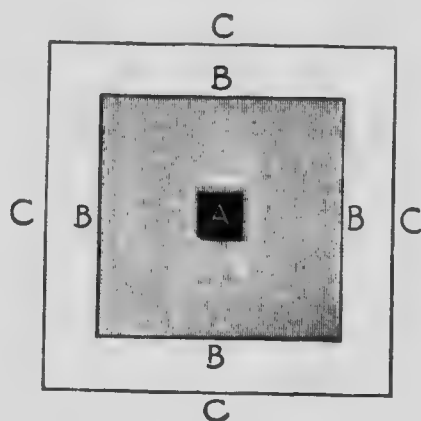


FIG. 36.

THE LAND UNDER CULTIVATION IN THE PRAIRIE REGION, SOUTH OF THE TIMBER LINE, IN 1900.

THE LAND UNDER CULTIVATION, 4,000,000 ACRES.

This diagram shows how great a territory yet remains to be filled up with farms. It suggests that, if the small square in the year 1902 produced for export 100,000,000 bushels of grain, that the future holds in store a prosperity which we cannot now even imagine.

At present the cultivation of wheat receives more attention than any other department of agricultural work, but the steady growth of mixed farming will probably change this in the course of time. In fact, even now farmers cultivate quantities of flax, barley, oats, and other kinds of grain, and nearly all of them own cattle, horses, sheep, and pigs. Other industries grow out of and are dependent upon agriculture. Thus the flour mills, the elevators, and the dairies depend for their success upon the prosperity of the farmers.

The accompanying picture of a flour mill at Winnipeg will give you an idea of the greatness of this industry. Nearly every town and village in the whole country has its mill. In one year ten millions of bushels of grain were ground into flour in Manitoba.

Many farmers own cattle, and it has been found profitable, in many places, to combine their dairies into one central dairy to which each man will send the milk or cream. Here it is made into cheese or butter and sent to the

**Mixed
Farming.**

Dairying.

markets. At the end of the season each farmer gets a share of the profits in proportion to the amount of milk or cream supplied.

In 1896 the Government of Manitoba established a Dairy School in the city of Winnipeg for the purpose of training young men and women in the process of butter and cheese making. This school has proven of great benefit to the industry in improving the quality of the exported products and

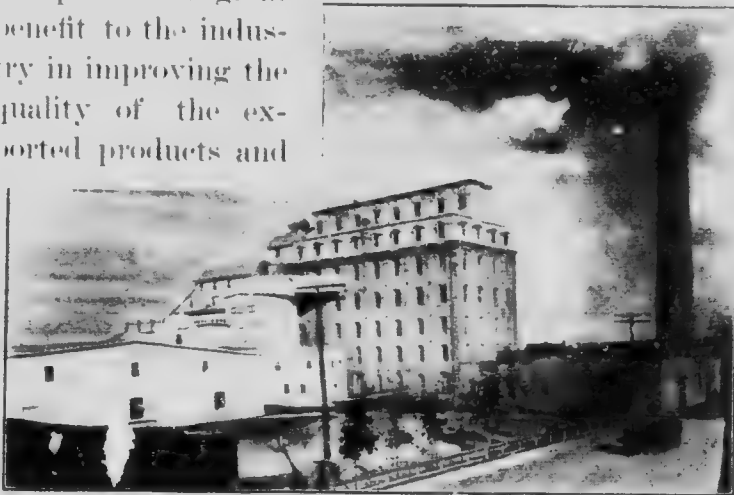


FIG. 37.

THE MILLING INDUSTRY.

in directing the attention of the farmers to the possibilities of this industry.

Fruit growing has not yet become an industry upon the three great prairie steppes.

Nearly all the cities and towns in the country owe their origin and prosperity to the agricultural industry which surrounds them.

In Western Assiniboia and Southern Alberta there are occasional years in which the rainfall is too scanty for successful agriculture by the ordinary methods of farming. (See map of irrigated land, Fig. 33.) The rivers flowing from the mountains to the plain were full of pure water. The soil was fertile, so the only difficulty to be solved was that of directing the water of these streams and pouring it upon the land at the times when it might be necessary.

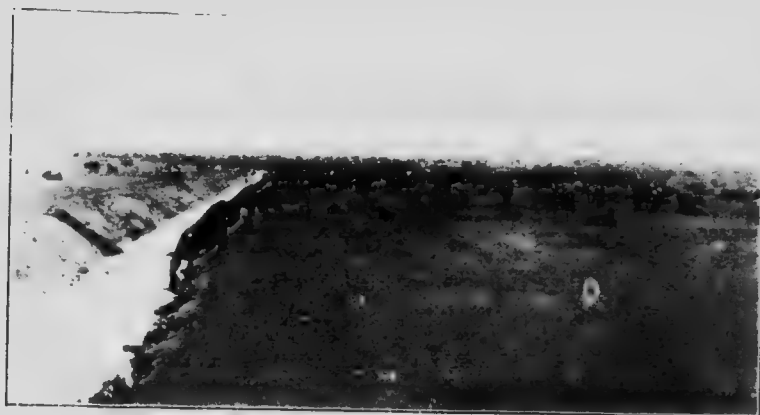


FIG. 38.

AN IRRIGATION DITCH.

Irrigation canals, upon rather an extensive scale (Fig. 38), were begun. The result is that the acreage at present (1902) within reach of irrigation from ditches already constructed has reached the total of more than half a million, and is extending with great rapidity.

**Irrigation
Canals.**



FIG. 50.
A CATTLE RANCH.

This land is not all settled upon, but when one considers that there could be no failure of crop on account of lack of rain, it will not be hard to foretell the future of so large a territory. The towns of Lethbridge, Cardston, High River, and Calgary are the ones which have thus far derived the chief benefit from the irrigation works as at present completed.

The lack of rain is, however, one of the chief reasons for the success of the cattle industry upon the highest steppe. The dry summer is noted for the absence of flies and for the natural curing of the prairie grass in such a manner that it forms good outdoor food for cattle during winter.

The Cattle Indus' y.

Southern Alberta was the early home of the cattle industry, and long held first place. During the last few years settlers have been flocking into this district, and are using the land for agricultural purposes;

thus many of the large cattle owners have been forced to remove to Western Assiniboia.

The climate near the foothills of the mountains is more suitable for cattle than that farther east, because of the influence of the **"Chinook" Winds.** "Chinooks," These winds are dry and warm, even in winter, and in a few hours will remove the snow which may be upon the plain, thus allowing cattle to feed upon



FIG. 40.

"ROUND-UP" OF HORSES.

the nature-made hay. The chief expense, therefore, of cattle raising upon this plain is the cost of herding and of making a few tons of hay as security against the possibility of an unusually heavy snow-

storm in winter. Farther east it is usually necessary to shelter and feed the cattle for at least a portion of the winter.

The care of cattle is only one phase of the great grazing industry. Herds of horses and flocks of



FIG. 11.

A FLOCK OF SHEEP.

sheep are also to be found, and the development of these branches will increase the total wealth of the great plain.

You must not suppose that the larger "ranches" have all the stock. Just count up all the farmers in the country, and take the number of cattle and horses and sheep they own. You will find the number many times that of the cattle upon the great ranches.

**Farmers
Extensive
Live Stock
Owners.**

Hog raising is likely to become a very important

branch of the industries of the great plains. At present it has not been developed sufficiently to supply the needs of the people. Still, a number of large packing houses are kept busy.

Among the towns interested in the cattle industry the following are notable: Calgary, Macleod, Lethbridge, Maple Creek, Medicine Hat, Swift Current.

The great forests upon the foothills and in the valleys of the Rocky Mountains; the great forests north of the prairie lands of Alberta,

The Lumber Industry.

Assiniboia, and Manitoba; and the great forests of the Laurentian region are almost, as yet, untouched. Yet the lumber from these supplies the greater part of the local demand. There are saw mills at Rat Portage, Winnipeg, Selkirk, Lake Winnipeg, Edmonton, Prince Albert, Calgary and many other places. Many men are employed and a very large amount of good lumber is produced.

For many years gold has been obtained from the sands of the North Saskatchewan River, near Edmonton. At the present time large

Minerals.

dredges are at work upon the river, but many men make good wages in washing the sands by hand.

Coal has been mined in large quantities in Alberta and Assiniboia. The chief minings are at Lethbridge, Canmore, Anthracite, Edmonton, Blairmore, Frank, and Estevan.



FIG. 12.
COAL MINES AT TEBBERVILLE.

The fishery employs about five hundred men, and has its largest development upon Lake of the Woods, Lake Winnipeg, and Lake Manitoba. Sturgeon and whitefish caught in these waters are sent frozen to the markets, chiefly of the cities of the United States. To prevent the lakes being emptied of fish, the catch of any season is limited by law. The great lakes of the far north have abundance of fish, but there is as yet no way of getting them into the markets of the world.

The fur trade of the far north is a source of considerable wealth to the Territories. The chief trading points are Edmonton and Prince Albert.

Great quantities of valuable furs are annually brought to these towns by the traders.

The industries named in the earlier part of this chapter are not by any means all there are. You can name many other occupations, such as the building of houses and the making of brick. You can also think of many people who are not engaged in the industries mentioned, yet they are busy every day at important and useful occupations.

Name some of these trades and professions.

Where do the train-loads of cattle and grain go? We see them go from our sight eastward, always

**Large Exports
of Grain and
Cattle.**

eastward; past the great lakes and the cities of Eastern Canada; past the ocean's stormy shores, to the old mother lands across the seas.

And why? In our country we produce much more bread material than our few people can use. In Europe there are countries where the people are so numerous that the land cannot produce bread enough for all. We, therefore, send them the bread material we can spare and in exchange they send us some of the articles they produce. Can you name some of these articles? Look about you; see your clothes, even the buttons. They are not made here.

The exchange of goods is called commerce, and many thousands of people are employed in the necessary work of carrying, handling, and storing

the goods. The great warehouses of our towns and cities are filled with the products of all land and the trains go roaring by, loaded with the things we send away or wish to have from distant lands.

At Fort William and Port Arthur are elevators and warehouses, and here is landed and shipped the vast commerce of the growing West. The railway companies have built great elevators and warehouses for the storage of grain and other merchandise, and at many points along their lines have stock-yards where cattle may be rested or shipped. To and from the terminal point of lake navigation upon Lake Superior sail fleets of vessels bringing to us the products of eastern lands and moving our products toward the markets of the old world. And with all this great commerce, it is still true that the development of the prairie country is little more than at its beginning.

APPENDIX.

POPULATION OF WESTERN CANADA.

	1870.	1881.	1891.	1901.
Manitoba	—	62,260	152,506	254,947
Assiniboia	11,963	—	30,372	67,385
Alberta	—	25,015	25,277	65,876
Saskatchewan, unknown, estimated at	8,000	—	11,150	25,679
Totals	19,963	87,775	219,305	413,887

The new settlers that have come into the Canadian West since the census returns were compiled will bring its present population up to more than half a million. The returns of the Immigration Department show that since April, 1901, when the census was taken, till the last day of October, 1902, 97,239 settlers have come into the Canadian West. The natural increase of population, generally estimated by statisticians at one per cent. per year, would account for an increase of 4,100.

The present population of the Northwest would therefore be, as nearly as it can be figured, as follows:

Population as per census of 1901	413,887
Immigrant arrivals, April, 1901, to Oct. 31st, 1902...	97,231
Estimated natural increase	4,130
Total	515,248

POPULATION OF WESTERN CANADA, APRIL, 1901.

I.—By Origins.

	MAN.	ALTA.	ASSA.	SASK.	Totals.
Totals	254,947	65,876	67,385	25,679	413,887
BRITISH—English	64,509	15,504	16,835	1,614	98,462
Irish	47,409	7,595	10,150	1,052	66,206
Manx	10	19	7	—	36
Scotch	51,355	9,178	10,803	1,520	72,856
Welsh	904	343	219	81	1,497
	164,187	32,639	38,014	4,217	239,057

POPULATION OF WESTERN CANADA

(CONTINUED)

	MAN.	ALTA.	ASSA.	SASK.	Totals.
Germans and Austrians .	33,172	8,537	10,330	4,306	56,397
French and Belgians . .	16,603	1,838	4,026	1,130	26,597
Indians	5,906	5,570	3,254	5,842	20,572
Russians and Roumanians	3,997	4,866	7,787	3,637	20,287
Scandinavians	11,926	3,904	1,411	75	17,316
Half-breeds	3,356	3,736	2,116	5,828	15,036
Galicians	3,898	616	627	484	5,626
Polish	1,712	425	264	18	2,418
	244,757	65,131	67,829	25,637	403,301

II.—By Birthplaces.

	MAN.	ALTA.	ASSA.	SASK.	Totals.
Canadian born	160,859	35,364	38,582	17,483	252,792
British born	33,409	7,262	8,553	797	51,021
American born	6,912	10,974	1,887	1,018	20,791
	201,171	53,600	50,022	19,298	324,604

POPULATIONS OF CITIES AND TOWNS—CENSUS 1901.

Province of Manitoba.—Winnipeg, Capital.

Birtle	466	Melita	485
Boisevain	898	Minnedosa	1,052
Brandon	5,620	Morden	1,522
Carberry	1,023	Morris	465
Carman	1,439	Neepawa	1,418
Dauphin	1,135	Portage la Prairie	3,901
Deloraine	678	Rapid City	566
Emerson	840	St. Boniface	2,019
Gladstone	731	Selkirk	2,188
Glenboro	450	Souris	839
Gretna	666	Stonewall	589
Hartney	505	Virden	901
Killarney	585	Winnipeg	42,340
Manitou	617		

The Territories.—Regina, Capital.

Battleford.....	512	Medicine Hat.....	1,975
Calgary	4,152	Moose Jaw	2,042
Canmore	450	Moosomin	868
Cardston	601	Prince Albert.....	2,193
Edmonton	2,626	Qu'Appelle	842
Fort Saskatchewan.....	587	Red Deer	851
Indian Head.....	768	Regina	2,645
Leduc	783	Strathcona	1,550
Lethbridge	2,279	Wetaskiwin	630
Macleod	796	Yorkton	700

RAILWAY LINES.

CANADIAN PACIFIC RAILWAY—			<i>Distance</i>
	<i>Junc. Points.</i>	<i>Terminus.</i>	<i>Miles.</i>
Main Line. West	Winnipeg	Vancouver.....	1,481
“ East.....	Winnipeg	Fort William...	427
South-Western Branch.....	“	Souris.....	150
Emerson	“	Emerson.....	66
Winnipeg Beach	“	West Selkirk ..	23
Pembina	“	Napinka.....	221
Estevan	Brandon	Estevan.....	164
Arcola	“	Arcola.....	123
Prince Albert	Regina	Prince Albert...	250
North-Western	Portage la Prairie ..	Yorkton	223
Edmonton	Calgary.....	Edmonton	192
Macleod	“	Macleod	106
Portal	Moose Jaw.....	North Portal...	167
Lethbridge and Crow's Nest Branch	Medicine Hat	Cranbrook	316
CANADIAN NORTHERN RAILWAY—			
Main Line, West.....	Winnipeg	Erwood	372
“ East	Winnipeg	Port Arthur...	439
Carman Branch	“	Carman.....	53
Emerson-Brandon Branch ..	“	via Morris-Brandon.	186
Hartney Branch.....	Belmont.....	Hartney	51
Delta	Portage la Prairie ..	Delta	16
Northern Pacific	Winnipeg.....	Pembina	68
Great Northern Railway	“	Gretna	67

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